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THE London Naturalist

(The Journal of the LONDON NATURAL HISTORY SOCIETY)

For the Year 1921.

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1922

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LIST OF MEMBERS.

ADDITIONS AND CORRECTIONS TO THE LIST OF MEMBERS AND ASSOCIATES.

In addition to those referred to in the Obituary, the following names should be deleted from the 1920 list :—

Members : ACHESON, BAKER, BARNES (H. J. & R. C.), BIRD, BOWMAN, COX, DIGBY (H.), GREENGRASS, GWATKIN-WILLIAMS, KIND, LATHAM (R.), LEGG, NEWBERRY, RAVEN, ROBERTS, SIMES, SMITH (A. C.), STUART, TODD, WOOD. *Branch Associates* : BACOT, LEES. *Country Associates* : WOOD.

The following names should be added :—

New Member : E. O. BUTLER, 60, Sutton Court Road, W. 4. (Ent.).
New Branch Associates : OSWALD F. COX and Miss M. GREENGRASS (from Members' List); STEPHEN LEIGH HUNT, "The Woodlands," Hale End, E.4. (Bot., Ent.); A. W. MERZ, "St. Mabyn's," Old Church Road, E.4; ARTHUR H. WARD, "Mayfield," Kimberley Road, E.4; W. A. WRIGHT, "Ringstead," Old Church Road, E.4.

Changes of Address : H. M. EDELSTEN to "Buntinghill," Balcombe Road, Haywards Heath, Sussex; OLIVER G. PIKE to "The Bungalow," Leighton Buzzard; Miss B. NICHOLSON, "Rothbury," Langdon Road, Upper Parkstone, Dorset.

TRANSACTIONS

OF THE

**London Natural History
Society**

For the Year 1914.

WITH LIST OF MEMBERS.

LONDON NATURAL HISTORY SOCIETY,
HALL 20, SALISBURY HOUSE, FINSBURY CIRCUS, LONDON, E.C.
L. REEVE & Co., LTD., 6, Henrietta Street, London, W.C.

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1915.

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LONDON NATURAL HISTORY SOCIETY

FOR THE YEAR
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PRICE THREE SHILLINGS

PUBLISHED BY THE
LONDON NATURAL HISTORY SOCIETY,
THE LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE,
KETTEL STREET, GOWER STREET, LONDON, W.C.1

1932

London Natural History Society.

Founded 1858.

Honorary President:

THE RIGHT HON. THE VISCOUNT GREY OF FALLODON, K.G., P.C.

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SIR LAWRENCE CHUBB; PROF. M. GREENWOOD, D.Sc., F.R.S., F.R.C.P.;
F. J. HANBURY, F.L.S., F.E.S.; L. B. PROUT, F.E.S.; J. ROSS.

OFFICERS FOR 1931.

All Offices in the Society and its Sections are Honorary.

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L. J. TREMAYNE, F.Z.S.

Vice-Presidents:

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F.E.S.; W. E. GLEGG, F.Z.S., M.B.O.U.; R. W. ROBBINS; R. MARSHMAN
WATTS.

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J. E. S. DALLAS.

Treasurer:

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Curators:

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Secretaries:

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FOSTER, B.A. (Syllabus Secretary); J. C. ROBBINS, F.E.S. (Publications
Secretary and Editor).

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F.E.S.; J. P. HARDIMAN, C.B.E., B.A.; MISS C. E. LONGFIELD, F.R.G.S.,
F.E.S., F.Z.S.; H. SPOONER.

Lanternists:

H. J. HUSSEY; H. A. LITTLEJOHN; B. T. WARD; C. WEEKS.

The Society is affiliated to the South-Eastern Union of Scientific
Societies, the National Trust and the Commons and Footpaths Pre-
servation Society.

PRESIDENTIAL ADDRESS.

(Read December 7th, 1920.)

When you did me the honour of electing me to the Presidential Chair I could not but feel some trepidation at being called to follow men of such high scientific attainments as those who have for recent years occupied that position. I should feel it a misuse of language to call myself a scientist, but if a love of nature and a keen pleasure in observing and studying natural history in many branches and acquiring a working knowledge of the phenomena displayed, makes a naturalist, to that title I may fairly lay claim. And when I recall my long association with this society and its forerunner the North London Society in which at one time or another I held office in many capacities, I have perhaps found some explanation of a choice which might otherwise have been inexplicable. However that may be, on this occasion you have honoured a general naturalist rather than an expert, and in the few remarks I have to make I propose to speak of natural history rather as a hobby, a mental and physical refreshment, than as a pursuit demanding lifelong devotion and full concentration of our powers. To the great majority of us, the necessity of earning our living makes such devotion impossible, even if we feel ourselves otherwise equipped for the task. There are of course degrees, and to some more than others are given the powers and the opportunities for serious scientific work, of which they have not failed to make good use. All honour to them. But in a society of amateurs such as this, most of the members inevitably regard natural history as a recreation, a relief from the strain and monotony of their workaday life. It has sometimes seemed to me that there is a tendency to decry this attitude as something trifling and unworthy, and that, although out of date, the spirit of intellectual snobbery that coined the phrase "mere collector" is not yet quite extinct. If it does exist it is quite out of place here. This Society was founded by mere collectors, is largely maintained by mere collectors, and should it cease to welcome the mere collector to membership, its career of usefulness would soon draw to a close. We may be collectors of butterflies, of plants, of birds' eggs, of nature photographs or we may simply collect records and observations of natural phenomena, but we are justified in our collecting if it harmlessly adds to our pleasure, and in the accumulation of facts and materials we are enlarging our minds and possibly, who knows, adding an essential stone to the structure of human knowledge. I take it for granted that we are in every case recorders as well as collectors. No naturalist is satisfied merely with the accumulation of specimens. At the least he keeps notes of the time and place and manner of their acquisition and unless he collects only in sale rooms he cannot fail to learn a great deal of the life and habits, the relationships and economy of the objects he acquires, and the addition

to his note book of facts accurately observed and clearly expressed gives to his collecting a value which at the time may be unsuspected.

This year we celebrate the bicentenary of the birth of that great collector and recorder of *facts* Gilbert White of Selborne, "the father of natural history." Nearly all White's life was spent in the village where he was born. After a short school life at Basingstoke he went to Oxford, and took his degree at Oriel, where he gained a fellowship. But he put aside the academic career of an Oxford Don for the life of a country parson at Selborne, which, but for a brief return to his university as junior proctor, he never left again. Here he spent his ample leisure in the study of the natural history of his parish, and recorded much of the results of his careful observations in a series of letters, written in a clear and graphic style and with such grace and felicity of diction that they have become a classic of English literature and an inspiration to every naturalist. We cannot doubt that his life, uneventful as it was, was happily spent in his beloved village and its charming natural surroundings.

The circumstances of his time and situation, favourable as they were, largely denied to Gilbert White one of the chief pleasures of the naturalist, which we in this society may enjoy to the full. I mean the association of others like-minded with himself. In our periodical meetings we are enabled to increase our knowledge, solve our difficulties and sharpen our enthusiasm. But also in the field, in our collecting and observing, how our enjoyment can be heightened by the company of kindred spirits. Of the many scenes I can recall, let me briefly describe two or three.

In the clear light of a summer evening, filled with the sweet scents of the Forest around, we walk out from Lyndhurst across the heath to the sugaring ground at Hurst Wood. A few geometers are netted on the way and on reaching the oak wood the trees along the ride are soon sugared. Dusk falls as we pause by the edge of the heath, nightjars flick past and owls hoot in the trees behind, then lamps are lit and the round of the sugar begun. Moths are plentiful, and an occasional "good thing" keeps us alert and pleasurably excited. Anon with full satchels we walk back in the twilight of the midsummer night through the wood and the sleeping village to our rooms, where, over a plain but substantial supper we look through our captures and make plans for the following day.

Or let me recall another summer night, passed upon the flat shores of the East Coast, where during the short, dark hours we sleep—somewhat fitfully—in a hollow of the dunes, until the nightlong cries of the redshank and the distant roar of the sea are mingled with the song of the lark, and in the dawn we sit under a bank of sand boiling our spirit kettle for an early cup of tea, and watch the dainty ringed plovers probing the shores of the creek at our feet, and the swallow flight of the terns about their nests on the pebble ridge beyond.

Or again, high noon in a Swiss valley. Upon the steep hillside we stand knee-deep in grasses and vetches, pink trifoliums, blue campanulas and golden hawkweeds, almost bewildered by the wealth

of insect life around us. Whites and clouded yellow, fritillaries and the puzzling *Melitæas*, burnets and skippers and coppers and blues in countless numbers, familiar many of them and yet on closer examination strange. How we revel in this naturalists' paradise! And comparing notes, adding knowledge to knowledge, we widen our views of genera, species and forms and begin dimly to realise something of nature's infinity.

To take one more scene. A wet winter night. In a cosy study, behind close-drawn curtains, with a good fire and plenty of tobacco sit two botanists. Sheets of specimens are piled on the table. A "critical" group is under discussion; and in examining, comparing, referring, the worries and discomforts of the past day are forgotten and time slips by unnoticed.

I have dwelt upon these happy memories, which, but for this Society, would probably never have been born, because I have sometimes thought that not all our members realise fully the advantages of association with others in their field work and study. Particularly I should rejoice to hear of younger members working together with the keenness and enjoyment which was characteristic of the Society twenty years ago. Perhaps they do. I hope so, for as the Society grows older, there must be added constantly the enthusiasm of youth if it is to remain a living force.

I have spoken of the pleasures of the naturalist and the enjoyment he derives, even as a "mere collector" in the pursuit of his hobby. But the tale of the advantages we may derive from the study of natural history is far from fully told. May I quote a passage by a well known writer, A. G. Gardiner, which in picturesque language presents another and wider aspect of the case. He had occasion to meet a man who was interested in boilers and machinery of all sorts. After much uninspiring talk on boilers by some means butterflies were mentioned. He continues "Whatever the cause, the effect was miraculous. He no longer looked at me as if I were a fellow-boiler; but as if I were his long lost and dearly loved brother. Was I interested in butterflies? Then away with boilers! Come, I must see his butterflies. And off we went as fast as petrol could carry us to his house in the suburbs, and there in a great room, surrounded with hundreds of cases and drawers, I saw butterflies from the ends of the earth, butterflies from the forests of Brazil and butterflies from the plains of India, and butterflies from the veldt of South Africa, and butterflies from the bush of Australia, all arranged in the foliage natural to their habitat to show how their scheme of coloration conformed to their setting. And as my friend, with growing excitement, revealed his treasures, he talked of his adventures in the pursuit of them, and of the law of natural selection and all its bearing on the mystery of life, its survivals and its failures. The hobby of his was, in short, his key to the world. At the magic word "butterflies" the prison door opened and out he sailed on the wings of passion in pursuit of things of the mind."

The writer goes on to point out what we as naturalists believe to be profoundly true. That the possession of a hobby is a steady

influence in our lives. It gives point and direction to our minds, food for the spirit of speculation and a path to the love of adventure that is in every man. Amid the tumult and perplexities of existence it provides a quiet anchorage where we can rest comfortably and cheerfully among things that we know, without fear of disillusion. And furthermore I think we can fairly claim that our love of natural history in strengthening our powers of observation, sharpening our critical faculties and leading us to cultivate a sound mind in a healthy body, is making of us better citizens, more worthy members of our day and generation.

ARCHAEOLOGICAL SECTION. REPORT FOR 1921.

1. Two members have resigned during the last year and two members have been elected, so that the membership remains at 20.

2. Four sectional meetings have been held during the year, an extra one being added besides the three allotted to the Section in the Society's rooms. These have largely been occupied with discussions on the Section's records, which have proved both useful and interesting. In addition however, Mr. Wattson has contributed a valuable paper on, "The Ornamentation of Norman Mouldings in England."

3. Three inspections have been made during the year: Namely, the church of St. Magnus the Martyr, Fish Street Hill, on February 26th, Stewkley Church, Bucks, on August 13th, and Bedfont Church, Middlesex, on October 22nd. Records of all these have been compiled, or are in the course of compilation, and are or will be in due course deposited in the Society's library.

4. The Section's arrangements, in common with those of others, were seriously interfered with by the national coal strike and other difficulties during the year. The projected week-end visit to Lacock Abbey in April had to be abandoned, as did also a substitutive week-end which had been contemplated for Stonehenge in October. Further, a visit to Waverley Abbey had likewise to be postponed, though it is hoped to bring this off next year.

5. The experiment was made of having a few informal expeditions to churches in the district, which it was hoped would attract members outside the section and widen their interests. But it cannot be said that the experiment was successful. The attendance in both of the two excursions tried was poor and almost confined to members of the section. On the other hand this may have been partly due to the time of year. The attendance generally speaking has been fair, and there are signs of increasing connection.

6. The scheme of recording inaugurated at the end of 1919 on the initiative of Dr. Simpson has been continued with some success. But its success have been almost entirely due to the indefatigable industry of our new Recorder, Mr. Stowell, who has taken up and carried on Dr. Simpson's work in a truly admirable manner, for which the warmest thanks of all our members are due to him. It is to be feared however, that Mr. Stowell has in many instances received inadequate support, and it is hoped members will do their best to rectify this. It cannot be too strongly impressed on all who join in the compilation of the records that a formal visit to the object to be inspected, before the actual inspection, is almost essential; but if, as is sometimes bound to happen, this is impossible, a visit after the inspection should be attempted, in order to see that all the work has been adequately dealt with and no point overlooked. It is further to be regretted that no new helpers have offered themselves, in spite of a pressing circular

which was sent round early in the year. Once more it is pointed out that the more widely this work is spread the less onerous it becomes on each particular individual; and it is hoped that every member of the Section will endeavour to take a part however small, in the very real and lasting work which it is doing for the Society.

The thanks of the Section are also due to Mr. Allingham for much valuable assistance in the photographic department.

7. The Second Annual Dinner of the Section was held at the "Ship Restaurant," Whitehall, on March 17th when Mr. Bishop was the guest of the evening accompanied by his sister, Mrs. Wilde. The function was well attended and much enjoyed.

8. Mr. Tremayne is succeeded in the Secretaryship of the Section by Mr. Allingham.

DOUGLAS B. ALLINGHAM, *Hon. Secretary.*
April 10th, 1922.

ARCHAEOLOGICAL INSPECTIONS, 1921.

St. Magnus the Martyr, E.C. 4.—Visited February 26th.

This renaissance example of Sir Christopher Wren's work, and one of the threatened City Churches was thoroughly examined and discussed by many members and visitors. Its history was traced back to Saxon times and it was noted that the Great Fire of London broke out close by. Apart from the Tower which was added in 1705 the main building was completed in 1676. The varied intercolumniation of the nave is explained by the fact that the original Wren building extended to the west end of the tower, which was then within the Church. After a second fire which occurred in 1760 alterations were made by cutting off the west end of the Church at each side of the tower, and forming under it a passage way which became a public footway to old London Bridge. This arrangement exists to-day but through the rebuilding of London Bridge in 1831 the passage way is no longer necessary as a public one. The tower-steeple is a very fine example of Wren's work.

A question having been raised as to the construction of a beam spanning across columns 24'-0" apart, it was generally agreed that the construction was timber and plaster although its appearance suggested stone. As somewhat to the detriment of the Renaissance, this delighted the Gothic enthusiasts.

The Record in the library touches on these and other points more fully.

St. George's Chapel, Windsor.—Visited March 19th.

Notice having been publically given of the temporary closing of this Chapel for extensive repairs opportunity was taken to examine this late 15th century example. Its general design and detail were compared with very similar buildings at King's College, Cambridge, and Henry VII. Chapel, Westminster.

Notes and sketches and photographs are in the Recorder's possession.

St. Catherine, Merstham, Surrey.—Visited August 6th.

Of this Church, of such varied interest, the early English tower should be noted and also the plan generally, as the development of parish church planning from the 11th century downwards can be studied from this example. Some notes and photo's are available for reference.

St. Michael, Steinkley, Bucks.—Visited August 18th.

Although this remarkable 12th century church has been much restored the work has been well done and practically the whole fabric is pure Norman in plan and detail. The latter is very profuse around doorways and windows. A rare embattled moulding was noted and the stair turret on the north side of the central tower was considered by some to be Norman, though all writers suggest 14th century. The Record in the library gives full detail. Compare Ifley.

St. Mary, Bedfont, Middlesex.—Visited October 22nd.

The originally small church at Bedfont has been considerably spoilt of late, but the original Norman chancel arch and south door of the same date together with other features made our visit extremely interesting. The Record discusses the relation of a recess on the south wall of the nave near the chancel arch and recessed wall painting on the north side to any rood loft there may have been. The main dimensions of those of the nave and chancel given by well-known writers and copied by subsequent publications, described as present day dimensions do not agree with our survey. Either the earlier writers were inaccurate or the building has been altered more recently than noted in contemporary accounts.

Hence the importance of checking rather than copying descriptions.

BOTANICAL SECTION. REPORT FOR 1921.

In reponse to the appeal of the Council for economy, the report of this Section for 1921 has been curtailed drastically. The publication of much important matter has been suppressed or postponed.

For the Northern portion, 5 new species have been added to the records, and 29 for the Southern. Noteworthy amongst the latter are *Silene nutans*, L., and *Mentha gentilis*, L.

Whilst on a visit to the Lake District, Mr. Hall found *Vicia orobus*, DC., *Circea alpina*, L., *Primula farinosa*, L., *Juncus filiformis*, L., and *Carex aquatilis*, Wehl. At Hastings in October he also found *Amaranthus deflexus*, L.

In the course of a holiday spent in Dorset, Mrs. Wilde and Mr. Bishop observed *Scorzonera humilis*, L., (in its only known British station), *Drosera anglica*, L., *Linaria repens*, Mill. \times *vulgaris*, Mill., *Iris foetidissima*, L., var. *citrina*, Bromf., *Eriophorum gracile*, Roth., *Carex punctata*, Gaud., *Polypogon monspeliensis*, Desf. \times *Agrostis alba*, L. (= *P. littoralis*, Sm.), and other rare species.

Mrs. Wilde has been unable to attend meetings, and has consequently resigned the Secretaryship of the Section. Mr. Bishop has been appointed Corresponding Secretary and Recorder, and Mr. W. Watson, Minuting Secretary.

Members are invited to bring the Section and the Society generally to the notice of their friends, and are urged to do all in their power to introduce new members.

The Recorder repeats his appeals of previous years for lists of plants observed in the Society's district.

R. W. ROBBINS, *Chairman*.

E. B. BISHOP, *Secretary*.

LEPIDOPTERA SECTION—ANNUAL REPORT, 1921.

The Section cannot yet congratulate itself upon a return to its pre-war standard. The losses in our ranks are not yet made good. There has, however, been an appreciable increase in the attendance at meetings and it is satisfactory to record that this increase has been specially marked in the case of field meetings. It may be that field-work provides at present the most useful form of activity for the section, and it is proposed to pursue this branch of study with some care.

Seven meetings were held at Winchester House during the year under review and three field meetings. There are no additions to the entomological fauna of the district to record. The Section is interested in the re-arrangement of the Society's collection of Lepidoptera and it is hoped that this work may lead to the amplification of the district lists, besides rendering the collection more useful to members. It will assist the Section if members possessing duplicate specimens in good condition, of any species, however common, taken in the district, will present them to the Society. Specimens from the Southern portion of the district are particularly needed.

E. A. COCKAYNE, *Chairman*.

HAROLD B. WILLIAMS, *Hon. Sec.*

REPORT OF THE ORNITHOLOGICAL SECTION FOR 1921.

1. The Annual Meeting of the Section was held on December 20th, when the following officials were elected to form the Committee for 1922:—Mr. W. E. Glegg, Chairman; Mr. S. Austin, Secretary; Mr. A. Brown, Recorder; together with Messrs. C. S. Bayne, J. E. S. Dallas and P. J. Hanson. Mr. C. S. Bayne was elected to represent the Section on the Publications Committee.

2. Five new members of the Society have joined the Section during the year, *viz.*:—Mr. and Mrs. Frank E. Lemon, Miss H. Watkins, and Messrs. J. P. Hardiman and S. T. T. Parsons.

3. The Section provided the following papers for the Society's Syllabus, which were read at Ordinary Meetings, *viz.*:—On May 3rd, "Scottish Heronries," by Mr. H. Boyd Watt, M.B.O.U.; on November 22nd, "Bird Protection—the Work of the Royal Society for the Protection of Birds," by Mr. J. R. B. Masefield, M.A. Three Sectional Meetings were held, at which the following papers were read:—January 18th, "The Raven," by Mr. D. H. Meares; June 21st, "The Cuckoo," by Mr. R. Hay Fenton; September 20th, "Observations on the

habits of some Shore Birds," by Mr. C. S. Bayne. On January 10th our chairman repeated his paper on "Macedonian Birds" to the members of the Chingford Branch, and again assisted them with a short lecture on the "Birds of Epping Forest" on March 14th.

4. The monthly Field Meetings of the Section bid fair to become a permanent and successful feature of our activities; two of the meetings were abandoned by reason of unforeseen circumstances, but the following were held :—

January 23rd.	Upminster.	Leader, Mr. L. Eynon.
February 20th.	Minims.	„ Mr. L. J. Tremayne.
March 20th.	Stanmore.	„ Mrs. G. E. Thomas.
April 24th.	Limpsfield.	„ Mr. R. W. Robbins.
June 26th.	Headley.	„ Mr. J. E. S. Dallas.
August 7th.	Theydon Bois.	„ Mr. P. J. Hanson.
August 28th.	Battlesbridge.	„ Mr. W. E. Glegg.
September 25th.	Higham Marshes.	„ Miss G. M. Towsey.
October 30th.	Tilbury.	„ Mr. P. W. Horn.
November 27th.	Bromley.	„ Mr. W. E. Glegg.

On November 26th, a visit was paid to the Ornithological Department of the Natural History Museum under the guidance of Mr. N. B. Kinnear, C.M.Z.S. It is proposed to arrange for similar visits in our future programmes. Your Committee held three meetings during the year.

5. It has been arranged to publish in the Transactions the paper read by Mr. R. Hay Fenton on "The Cuckoo" (see pp. 1-9), and the Sixth Annual Report on the Birds of Epping Forest will be printed, as usual (see pp. 70-75).

6. Only 7 birds were "ringed" during the year under the "British Birds" Marking Scheme. Members are urged to give more attention to this important branch of our work.

7. The photographic collection of birds and nests now numbers 116 sheets.

8. Three species new to the Society's district have been recorded, making the total number 162. These new occurrences are :—*Motacilla alba* (White Wagtail), September 4th, 1921, Chingford Plain, recorded by Messrs. Glegg and Austin; *Phalacrocorax carbo* (Cormorant), August 6th, 1921, two immature birds on an island of No. 5 Reservoir, Walthamstow; August 20th, one on the Racecourse Reservoir; August 27th, two on the Racecourse and two perched on a tree on an island on the High Maynard Reservoir. Subsequently on the Racecourse as follows :—September 3rd, two; September 10th, one; September 24th, two; October 1st, one; October 8th, two; on all the visits the birds were resting on an island; recorded by Mr. W. E. Glegg (see "British Birds," vol. xv., p. 213; and "Essex Naturalist," vol. xx., part 1, p. 47). *Colymbus stellatus* (Red-throated Diver), one shot near sluice house, Walthamstow Reservoirs, November, 1911, by Mr. Dakin (specimen now in the Essex Museum at Stratford), reported by Mr. W. E. Glegg; a bird in winter plumage was observed on the Upper

Penn Pond, Richmond Park, on February 13th, March 13th and 20th (see "British Birds," vol. xiv., p. 261), recorded by Miss G. M. Towsey and Mr. J. E. S. Dallas.

9. Other interesting records are as follows :—*Corvus corone* (Carrion Crow), observed in parties on the Walthamstow Reservoirs :—February 5th, 1921, twenty; October 8th, twenty-five; November 19th, thirty-two; December 3rd, thirty; recorded by Mr. W. E. Glegg (see "Essex Naturalist," vol. xx., part 1, p. 47); *Fringilla montifringilla* (Brambling), High Beach, flock of about 17, April 20th, 1921, recorded by Mr. P. D. Hayward (per S.A.); *Motacilla boarula* (Grey Wagtail), Loughton, September 1st, 1921, recorded by Mr. Percy Thompson (per W.E.G.); Woodford Green, October 31st, 1921, recorded by Mr. H. C. Playne (per S.A.); and Hatch Plain, December 16th and 25th, 1921, recorded by Mr. W. E. Glegg; *Locustella naevia* (Grasshopper-Warbler), Loughton, middle of May onwards 1921, recorded by Mr. V. G. Davey (per S.A.); *Saricola rubicola* (Stonechat), Loughton, nested July, 1921, recorded by Mr. V. G. Davey (per S.A.); *Euanthe oenanthe* (Wheatear), Chingford Plain, September 4th, 1921, recorded by Messrs. Glegg and Austin, *Spatula clypeata* (Shoveler), Walthamstow Reservoirs, August 27th, 1921, three at least, recorded by Mr. W. E. Glegg; *Scelopax rusticola* (Woodcock), Loughton, December 12th, 1921, recorded by Mr. P. D. Hayward (per S.A.); *Tringa hypoleucos* (Common Sandpiper), South Weald, Essex, August 26th, 1921, recorded by Mr. P. W. Horn; Staines Reservoir, August 11th, 1921, recorded by Mr. W. E. Glegg; Walthamstow Reservoirs, August 6th, 20th and 27th, 1921, recorded by Mr. W. E. Glegg (see "Essex Naturalist," vol. xx., part 1., p. 47); *Tringa ochropus* (Green Sandpiper), Ockenden, Essex, August 11th, 1921, recorded by Mr. P. W. Horn; Walthamstow Reservoirs, August 20th and 27th, 1921, recorded by Mr. W. E. Glegg (see "Essex Naturalist," vol. xx., part 1., p. 47); *Numenius arquata* (Curlew), Loughton, September 7th, 1921, recorded by Mr. P. D. Hayward (per S.A.); *Larus fuscus affinis* (British Lesser Black-backed Gull), Walthamstow Reservoirs, two, September 24th, 1921, recorded by Messrs. Bayne and Glegg (see "Essex Naturalist," vol. xx., part 1., p. 47); *Podiceps cristatus* (Great Crested Grebe), Staines Reservoir, 100 to 150 birds, August 11th, 1921, recorded by Mr. W. E. Glegg (see "British Birds," vol. xv., p. 90).

10. We have to thank the following observers for their assistance in compiling our local records during the past year, *viz.* :—Miss G. Lister, Messrs. R. S. Archbould, V. G. Davey, P. D. Hayward, and P. G. Thompson.

S. AUSTIN, *Secretary*.

REPORT OF THE PLANT GALL SECTION, 1921.

The section has held three meetings during the past year at which papers were read and discussions took place on the galls on Compositae, Labiatae, and Rosaceae respectively, and various specimens were exhibited.

Species new to Britain have been shown and records of rare species noted at the ordinary meetings of the Society.

Owing to causes outside our control the expeditions fixed for the summer had to be abandoned, but in spite of this a good deal of material has been collected, and observations made by the members independently.

The following are some of the more interesting records:—Galls on Oak have been very irregular. *Andricus globuli* which was so abundant in 1920 has not been noted this year. *A. collaris* was very rare on *Quercus robur*, but was found on *Q. cerris* at Bedfont, Middlesex. *Neuroterus numismatis* was by far the most plentiful of the spangle galls, being very abundant in various places round London and also in Yorkshire. *Dryophantas* were very scarce. Old galls of *Andricus circulanus* were plentiful on *Q. cerris* near Hanworth, Middlesex, and were also found near Horsley, Surrey.

Eriophyes galii has been observed frequently but was not nearly as ubiquitous as it was last year on various species of *Galium*. The white hairy gall recorded last year on *Galium aparine* from near Bedfont was not to be found this year, and only one root of the plant was to be observed in the summer on the area occupied by the galls last year. In October a lot of young plants were to be seen, but no galls.

Eriophyes conroleus on *Euonymus europæus* was found near Horsley. *E. euaspis* on *Lotus corniculatus* in Yorkshire. *E. tiliae* var. *ecilis* on *Tilia grandifolia* near Leatherhead. *E. macrotrichus* on *Carpinus betulus* in Bucks. *E. atrichus* on *Stellaria graminea* in Yorkshire. *Salix verbenaca* was found in Surrey covered with white hairs possibly due to *E. salicæ*. On September 9th, Mr. L. B. Hall found live *Eriophyes* in large numbers on galls attributed to *E. triradiatus* on *Salix fragilis*.

Perrisia acrophila on *Fraxinus excelsior* was plentiful in one district near Perivale, Middlesex, *P. silvicola* was found on *Stellaria holostea* in Bucks, *P. bryoniae* was again seen near Hanwell, Middlesex. *P. carpini* on *Carpinus betulus*, Bucks, *P. tabicola* on *Cytisus scoparius*, Yorkshire. And several larvæ of a *Cecidomyid* on *Ballota nigra* (Houard 4849) at Chiswick, Middlesex, and near Tilbury, Essex.

Unidentified larvæ were found galling flower heads of *Solidago virgaurea* and *Centaurea nigra* in Yorkshire.

Isosoma graminicola was found on *Agropyron pungens* and *Aphis atriplicis* on *Atriplex littoralis* between Purfleet and Tilbury. *Pemphigus fluginis* on *Gnaphalium uliginosum* was found north of Bracknell, Berks, and an unidentified micro-lepidopterous larva causing a swelling in the stem of *Beta maritima* near Tilbury.

Mr. L. B. Hall recorded species of galls observed by him in the Lake district including *Eriophyes stenaspis* on *Fagus sylvatica* and what appears to be *Andricus sufflator* on *Quercus robur*, both from Cumberland.

HAROLD J. BURKILL.

Recorder.

December 31st, 1921.

CHINGFORD BRANCH—REPORT FOR 1921.

There has been again an improvement in the attendances of the Chingford Branch meetings, the lowest being 19 on an unfavourable evening and the highest 38 showing an average of 28 as against 25 in 1920.

There have been nine indoor meetings, at 8 of which the following papers or lectures were given:—"Macedonian Birds," by W. E. Glegg, F.Z.S.; "Notes on aquatic insects," by C. L. Withycombe, B.Sc.; "Short lectures on Epping Forest," by A. G. Hubbard, B.Sc., W. E. Glegg, and A. Capleton; "Medicinal Plants," by J. G. Everett, Ph.C.; "Darwinian Selection and Disease," by Dr. Greenwood; "Alpine Notes and Recollections," by E. Samuelson; "Water Plants," by Miss G. Lister, F.L.S.; "Bees and Bee-keeping," by A. Bacot, F.E.S.; At the December meeting there was an exhibit of Microscopes which was much appreciated. The branch suffered a loss in the death of Mr. H. Y. Loram, F.I.C., one of the oldest and most active members and a man of considerable scientific attainment especially in the region of Geology and Mineralogy.

A. G. HUBBARD, B.Sc., *Branch Chairman*.

E. SAMUELSON, *Local Secretary*,

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OBITUARY.

ARTHUR W. BACOT.

Rarely, if ever, has the entomological world sustained, within the course of a few brief months, two such heavy losses as have befallen it in the deaths of Dr. T. A. Chapinan, last December, and of Arthur W. Bacot, on April 12th of the present year. Rarely indeed has such a double tragedy been even possible, for it is scarcely too much to say that they were, in their respective spheres, the two towering figures of our time, and that they should have lived and worked side by side was in itself a thing of no every-day occurrence.

The subject of this memoir, as is already only too well-known to many of our readers, was another of the ever-lengthening line of "martyrs to science," a victim of typhus in Cairo, where he was engaged in researches for which his invaluable services had been lent to the Egyptian Government by the Lister Institute. Those of us—and there are many—who have known and loved him and have appreciated his absolutely selfless devotion to the cause of science and of humanity, will be ready to endorse the saying of a friend, already published in the "Daily Chronicle," that if ever a man deserved the Victoria Cross, that man was Arthur Bacot.

By a Society formed by the fusion of the City of London Entomological and Natural History and the North London Natural History Societies, the name of Arthur Bacot will be held in peculiar honour. A member of the latter from its foundation in 1892, and of the former from the same date, a regular attendant at their meetings and excursions, a constant contributor for many years to their discussions and exhibitions, always alert and ready with helpful criticism or original suggestion, yet never self-assertive or opinionated, he exerted an influence over his fellow-members which can never be calculated. Perhaps especially of the North London, he was one of the pillars. He sat on the Council continuously from 1894, occupying the entomological curatorship in 1900, a vice-presidency from 1903 to 1908, and again of the amalgamated society from 1915, and the presidency in 1912 and 1913. He did invaluable work for the Biological Research Committee between the years 1904 and 1910, besides rendering useful service to the Lepidoptera Section. He was also a Fellow of the Entomological Society of London from 1901, and served on the Council from 1916 to 1918.

Handicapped in his youth by indifferent health and consequent limitations of his educational opportunities, Bacot more than made up for this by his assiduous reading and his cultivation of habits of logical thinking and reasoning. He was a keen lover of nature and an almost indefatigable field-worker, but if he ever suffered from the "mere collector" complaint he must have very quickly outgrown it, and almost our earliest recollections of him are of the keen and wideawake observer,

always athirst for more knowledge, always desirous of fitting each newly-noted fact into the "scheme of things."

Although it is not altogether easy to single out his *forte*, where he excelled in so many things, it is perhaps safe to say that the larval stages of the Lepidoptera afforded his favourite study, and even as far back as the "nineties" he was a recognised master in breeding and describing these, as such papers as that on "The Genus *Smerinthus*" ("Ent. Record," vi., 173-81, 1895), "The Relationship of *Endromis versicolor* to the Sphingides" (ibid, vii., 227-30, 246-8), and others, will bear witness. Other groups of whose ontogeny and phylogeny he enormously advanced our knowledge, especially during the first decade of the present century, were the *Liparidae* and *Lasiocampidae*, besides some Saturniids, some Arctiids, etc.

The wider problems of biology had always the greatest fascination for him, and he was an able exponent of Weismannism, which he whole-heartedly embraced (vide the "Century Number" of the "Entomologist's Record," vol. xiii., pp. 44-47), a careful and open-minded student of Mendelism, of Thayer's view of Protective Coloration, and indeed of every theory worthy of serious thought, and his was an important share in the shaping of the paper on Neo-Lamarckism (October, 1905), and others which were given by the Biological Research Committee of the North London Natural History Society. Hybridisation also attracted him, and he has left his mark on the literature of hybrid *populi-ocellatus*, hybrid *Tephrosia*, etc.

From the commencement of Tutt's colossal work on the "British Lepidoptera" (1899 *seq.*) Bacot was an ungrudging collaborator, and his magnificent work in connection with that undertaking is eulogistically referred to in the prefaces to the volumes, but is really beyond all telling; only those who have had an occasional "peep behind the scenes" can form any conception of what it meant for a busy man to retain the threads of the breeding, describing, revising, summarising and correlating, during those strenuous days.

In 1909 the Royal Society published ("Proc.," Series B., vol. 81, p. 138) Bacot and Prout's Memoir on the cross breeding of two races of *Acidalia virgularia*. This was to be almost the last of Bacot's larger contributions to the study of the Lepidoptera; henceforth he was to work in another field.

Shortly after he settled in Loughton—early in 1909—he was introduced to Professor C. J. Martin, F.R.S., Director of the Lister Institute, and a member of the Advisory Committee for Plague Investigations. It had already been established that the rat flea was responsible for the transmission of bubonic plague from rodents to man, but, although the morphology and taxonomy of this insect had been closely studied, its bionomics were almost untouched. Professor Martin recognised at once that Bacot was the man to gain the needed knowledge, and at his suggestion the Advisory Committee invited Bacot to undertake the enquiry. At this time Bacot's name was hardly known outside the circle of Lepidopterists, and the Committee had no power to offer him a permanent post. What was done was to provide him

with a laboratory assistant and apparatus. Thus assisted he fitted up a rough laboratory in his garden and, in the time left *after the exclusion of the hours from nine in the morning to six in the evening on five days a week*, he investigated the bionomics of fleas. The product, which in its final form occupied 206 pages of the "Journal of Hygiene," is one of the classics of Entomology. All the questions asked by the Committee were answered, and Bacot's position as one of the great investigators of his time was at once established. Some of his later work, such as his discovery (in collaboration with C. J. Martin) of the precise mechanism of transmission of plague from flea to man, was more dramatic; none was more romantic in the proper sense of that word. In the time to come, the literally true statement that the "Study of the Bionomics of the Common Rat Flea" was conducted in a disused stable in the leisure moments of a man who spent nine hours a day in a city office will be deemed an impudent invention. Bacot, however, had his reward—a very modest one as men judge such things, but to him a source of great happiness. At the end of 1911 the Governing Body of the Lister Institute created a post of Medical Entomologist on their staff and invited Bacot to fill it. He entered upon his duties early in 1912, and the almost dreamlike happiness of his first year of wholtime service in the cause of science is to his intimates a fragrant memory. Custom did not stale this, and it is certain that, if he could have foreseen the end, he would not have exchanged the ten ensuing years for thirty under other conditions. Between 1912 and 1922 he published more than thirty papers—all valuable; some classical. They reveal the same powers of scientific imagination and accurate observation, re-inforced by a steadily widening knowledge of epidemiology and the phenomena of disease. Space does not permit of even a list of titles, but if one item were to be selected for mention, perhaps the "Report of the Entomological Investigation undertaken for the Yellow Fever (West Africa) Commission" (London, 1916, Churchill, p. 191), gives the best idea of his genius. In this report he communicated the discovery that the eggs of mosquitoes cannot develop in sterile water.

He concentrated upon the study of *Pediculi* in the latter years of the war, and was thence led to investigate the diseases, notably Trench Fever and Typhus, conveyed by these parasites. Being the foremost authority on the bionomics of lice, his services were requisitioned, first for the study of the typhus problem in Poland and then for a special inquiry in Egypt. The story of this last adventure is known to all our readers; Arthur Bacot died of typhus at Cairo, on April 12th. "The sacrifice of such a life is as sad as it is truly glorious." These words are from a letter addressed by the President of the Royal Society, Sir Charles Sherrington, to one of the present writers. The gallant soldier in the army of researchers would have valued that tribute from the commanding officer. Nor can we add anything to it. Those who knew and loved the man do not need to be reminded that they have lost more than a scientific colleague; to those who had not the privilege of his acquaintance no idea of his personal qualities can be conveyed in a few words.

Science has no place for championships. It is idle to dispute whether Laplace was a greater man than Darwin, or Helmholtz superior to Kelvin. It is even hard to say what we mean by the attribute "great." But there are not many connotations of the term which would render it inapplicable to Arthur Bacot.

THOMAS HUCKETT.

The death of Mr. Thomas Hockett took place on Friday, April 7th, 1921, at his residence in Islington.

He was an Honorary Member of the Society from 1908, and a Trustee of the City of London Entomological and Nat. Hist. Society from 1892 to 1907.

He was born in 1842, as was his old friend J. A. Clark (whose death occurred in 1908), and was one of the earliest members of the original Haggerston Entomological Society, of which he was President in 1883, when that Society sent a petition, with very many signatures, to Parliament against the G. E. Railway Bill for the proposed extension of the line from Chingford to High Beach.

His first introduction to entomology is believed by the writer to have been when he took a position as assistant to Edward Newman, who refers to him as furnishing him (Newman) with an unceasing supply of caterpillars for description in "The Zoologist." He was well acquainted with Henry Doubleday, of Epping, and another of the few remaining "links with the long past" has therefore been broken by his death.

Consequent on his many years of total blindness, patiently and bravely borne, he was unable to take an active interest in his beloved Entomology, but he eagerly awaited the writer's almost weekly visits with news of anything relating to collecting or rearing Lepidoptera, and the memory he showed, almost to the last, of the most minute details of form and colouring was most marvellous.—W.G.P.

The Society has also lost by death, during 1921, Dr. T. A. Chapman, Mrs. Hanson, Mrs. E. A. Nicholson, and Mr. H. Y. Loran.

THE CUCKOO.

By R. HAY FENTON.

(Read before the Ornithological Section of the L.N.H.S., on June 21st, 1921.

Although the chief aim of this paper is to deal with the eggs of the Cuckoo perhaps a few remarks by way of introduction about the bird itself and its habits may not be out of place. This well-known, interesting but mysterious, bird, which in size is somewhat less than a Pigeon, shaped like a Magpie and of a greyish ash, and in some cases light lavender grey colour, usually arrives on our southern shores from Africa about the middle of April. Its arrival varies—being either earlier or later as the season seems to be more or less forward, and the weather more or less inviting. Many of them rest for a day or two in the Channel Islands after their long and exhausting journey before they come to the mainland. The old birds leave again towards the end of July or beginning of August, the young, or birds of the year, following as best they can about the end of September or beginning of October. This mode of migration is exactly the reverse of other migratory birds, who allow the birds of the year to depart first on their unknown journey. Why the old Cuckoos, who feed largely on caterpillars, especially hairy ones, should be in such a hurry to get away while there is yet an abundance of suitable food is a mystery but it is said that the House Martin will leave a nestful of young to perish rather than be late when the time for departure arrives and it is suddenly seized with the migratory impulse. So it is just possible that it is such an impulse which impels the old Cuckoos to take an early departure. Once arrived they distribute themselves over the length and breadth of the land including the Islands of our Western Coast. They return year after year to the same locality and never wander very far from their favourite area. The domestic life of the Cuckoo is somewhat peculiar. They do not pair. No nest is built. The eggs are laid on the ground and carried by the female in her bill to the nests of the fosters selected to receive them, and if time and circumstances permit some of the foster's eggs are usually removed. This is no doubt done for a purpose, for when eggs are removed or destroyed the young Cuckoo when hatched has not so many birds or eggs to eject from the nest before it become the sole occupant. This habit, unique among British Birds, is practised by many others elsewhere, and in particular by the American Cattle Starlings. One of these indeed goes even farther, since it entrusts its egg to the care of a nest-building cousin. There are also American Cuckoos that build their own nests and incubate their own eggs. The Cuckoo not only removes eggs but it frequently kills young birds. The following incident was related to me by a collector friend in Lancashire. Some quarrymen knew of a Meadow Pipit's nest containing four young birds.

One afternoon they noticed a Cuckoo flying about near the nest. The young were quite well when the men left their work in the evening but on looking into the nest on the following morning all the young birds were dead. The cause of death was a single puncture in the abdomen. A fortnight after these men again found the Meadow Pipit's nest not more than ten yards from the site of the old one. This time it contained four eggs and one of a Cuckoo, so they came to the conclusion that the young birds of the first nest were deliberately destroyed in the hope that if another nest was built the Cuckoo could place an egg in it. A similar instance of the young being killed is related by Mr. C. E. Milburn, in "British Birds," vol. 9, page 95.

If we take the average clutch of foster's eggs at four and consider the eggs destroyed and the young killed, the number of birds annually sacrificed must be enormous. In my own collection of 521 Cuckoo eggs the accompanying foster's eggs number 1853; add to this the number of eggs destroyed and the total cannot be far short of 2000 for 521. Ornithologists are not well agreed as to why the Cuckoo does not make a nest of its own and rear offspring like other birds. Some authorities think that as the males greatly outnumber the females the latter are so pestered by the attention of the males who chase them from place to place that they have no time to build a nest. Others say that they are too lazy. Not a few assert that they are so intent on feeding that the thought of a nest never seems to trouble them. Most works on ornithology tell us that the Hedge Sparrow and Meadow Pipit are the two birds most usually imposed upon. This is no doubt true to a certain extent, but it must not be forgotten that both birds are so common that their nests are available all over the country—especially that of the Hedge Sparrow; but in some districts where the nests of these two birds are fairly common other species are more favoured than they are. For instance at Sandwich, Huntingdon, Wisbech and Evesham, the Reed Warbler is the common foster. At Clitheroe in Lancashire the Yellow Wagtail, in the Fell district, the Twite, and in Pomerania the common Wren. Of 421 British-taken eggs in my collection 27 were found in Hedge Sparrow nests and 37 in the nests of the Meadow Pipit, but there are 30 Sedge Warbler, 32 Tree Pipit, and 64 Reed Warbler fosters, so that in this collection at all events Hedge Sparrows and Meadow Pipits are in the minority as foster parents. The number of birds who at various times have been imposed upon is very large. I myself possess 59 different fosters. Mr. E. Bidwell, in the "Ibis" of 1896, gave an interesting list of no fewer than 119, but I could add between 20 and 30 other birds who have fallen victims since this list was compiled. A very difficult foster for collectors to obtain is the Grey Wagtail. Full clutches of 5 or 6 are quite common about the 25th April, or something like 10 days after the arrival of the female cuckoo, so that by the time she is ready to lay the nests of the Wagtail contain young birds, and are therefore not available. However, when a second nest is built after the young of the first brood can fly, or when a nest is built to replace one already taken and contains eggs 12 or 14 days after, the Cuckoo—which by this time has commenced

to lay—for some reason or another seems to avoid the nest of this species altogether. A correspondent who has seen hundreds of nests of the Grey and Pied Wagtails informed me that when the Cuckoo has the choice of both nests (and he has seen them placed almost side by side) it will always select the nest of the Pied Wagtail. This seems most extraordinary, because in this locality where the Grey, Pied, and Yellow Wagtails are all found, the Yellow Wagtail, which lays an egg somewhat like that of the Grey, is favoured almost to the same extent as the Pied, while the Grey is left severely alone. Although the nests of soft-billed birds are more frequently used than those of "hard-bills," I do not think the question of diet has anything to do with the Cuckoo's selection, because the young of all birds while in the nest are largely fed upon what one might call soft, sloppy food—insects and caterpillars. Besides, the young Cuckoo seems to have extra-special digestive organs which enable it to assimilate and thrive on the menu of any foster in whose nest it is hatched. One good reason why soft-billed birds are more favoured is that their nests are more numerous and consequently a greater number are at the service of the Cuckoo. Of the 59 fosters before mentioned 45 are soft-billed birds and 14 hard-billed.

The young Cuckoo is a most pugnacious and ill-behaved bird. What else could be expected? It is put out to nurse on the baby farming principle and has not the benefit of a parental upbringing. I once found one sitting on the ground fostered by a pair of Tree Pipits, and when I gently touched it with my walking stick it rolled over on its back, showed fight by opening its capacious mouth and striking out with its feet like a young Peregrine. It may be of interest to say in passing that the young of the Peregrine, when the nest is on the face of an inaccessible cliff, may be easily captured from above by attaching a ball of wool to a string and dropping it into the nest below. The young birds will roll over and claw the wool and getting their feet entangled in it are easily drawn up. The young Cuckoo is furnished with a cup shaped cavity in its back which fills up after the twelfth day and is apparently of no further use. When only thirty hours old it commences to fidget, and into this depression it hustles the other youngsters, and one by one ejects them from the nest so that it may receive the entire care and attention of the fosters. If any of the foster's eggs are still unhatched they share the same fate. Some years ago a friend found a young Cuckoo in a Robin's nest and the Robin's five eggs lying close beside, no doubt turned out by the young Cuckoo. They were all on the point of hatching. I have often wondered how a young Cuckoo fares when born in the domed nest a Wren, how it manages to eject the other occupants and crawl out itself before it gets too large to escape by the tiny aperture of the nest.

The appetite of the young Cuckoo is enormous and the fosters are kept busy all day long satisfying the hungry interloper. It has been noticed that the young rascal gets very impatient and seems to scold and peck at the fosters if supplies are not brought fast enough and in sufficient quantities. Such a scene was once witnessed by my brother who on several successive days watched a pair of Whitethroats feeding

one. He assured me that the youngster seemed to read the old birds a lecture when they remained away longer than they ought to. It is not perhaps generally known that if for some reason or another a young Cuckoo is deserted by its foster parents it will soon be adopted and brought up by some other bird. This, too, is strange, as I believe all birds know instinctively that the Cuckoo is an enemy—just as one would say: "I don't like the look of that man or woman." A Yorkshire friend was watching a pair of Meadow Pipits feeding a young Cuckoo, when suddenly a Sparrow-Hawk pounced on and carried off one of them. The other bird continued to bring food, but apparently not in sufficient quantities to satisfy the Cuckoo, for it commenced to call louder and louder (I do not suppose for a moment it was lamenting the untimely end of its parent). At last a kindly Chaffinch appeared on the scene and took the place of the late Pipit, bringing food and feeding the youngster as if it has been one of the original fosters. My friend who witnessed this told me that he had frequently seen Blackbirds, Thrushes, Robins, and Hedge Sparrows, take compassion on and feed a Cuckoo when calling for food. I remember seeing a number of sparrows feeding on some bait which had fallen out of the nosebag of a horse. Among them was a young one who kept fluttering about begging to be fed, and as I was curious to know what would happen I watched it for a time and noticed four different adults come and feed it. Perhaps it was some such kindly feelings which prompted the different birds I have just mentioned to take compassion on the young Cuckoos. I do not pretend to know about music, but I believe the distance between the notes of the Cuckoo is a major third. As the season advances the key changes and the clearness of the two distinct notes is gradually lost and at last its voice breaks altogether. White, of Selborne, says that neither Owls nor Cuckoos keep to one key, the note varying in different individuals. About Selborne he found they were mostly in D. Two were heard singing together, the one in D and the other in D sharp, which made a disagreeable concert. The cuckoo is mentioned in the Book of Leviticus, at the 11th chapter and the 16th verse; but whether this is our Cuckoo or some other bird I will leave students of the Bible to decide.

Eggs of the Cuckoo may be found from the end of April till the middle of July. The 481 British-taken eggs already referred to were found as follows: 2 in April, 210 in May, 208 in June, and 11 in July.

The two April eggs were both taken in Robins' nests, on the 29th and 30th of that month. The last two July eggs were taken on the 14th and 15th, the first in the nest of a Hedge Sparrow and the second in the nest of a Reed Bunting. Generally the egg of the Cuckoo bears more resemblance to the egg of the Skylark than to that of any other British bird, both as regards size and markings, and it is sometimes rather difficult to identify them. However, an experienced collector can usually tell them at a glance. As a rule they are somewhat rounded at the thin end, and when carefully examined they will be found to be more or less covered with minute specks, as if a house fly had been walking over them. By the aid of a powerful glass these

dark spots, which vary a good deal in number and size, will be found in many instances to be small indentations. In the blue type of egg to which I will presently refer, these indentations are also found and look as if the bird had accidentally put its claw through the shell and afterwards carefully filled up the holes with blue wax, but the mending is dull in comparison with the rest of the glossy shell. The best test, however, is to weigh a doubtful egg which if properly prepared is about 14% heavier than any other British birds egg of the same size. I weighed 50 blown eggs which gave the following result: 33 weighed 3 grains and 17 weighed $3\frac{1}{2}$ grains.

Unblown eggs weigh from about 44 to 54 grains. The average measurement is $11\frac{1}{2}$ lines long by $8\frac{1}{2}$ lines broad. They are very small for the size of the bird, being, as I have already said, about as large as that of the Skylark. Yet the comparative size of the birds is as 4 to one. German taken eggs are not so fine and large as our British ones. They are as a rule rather smaller and do not show so much variations. Many of them bear a strong resemblance both in size and appearance to the eggs of the Blackcap and Garden Warbler. It is difficult to say how many eggs a Cuckoo lays in one season. Colonel Montagu mentioned 5 or 6, but I think that is much under the mark. In 1918 Mr. Edgar Chance found 10 by one bird, and in 1920 I believe he found 21 by another. In my own collection I have 3 sets of 6, 1 set of 7, and 1 set of 10.

I have also a set of 5, but it should really be a 7 set as other 2 eggs by the same bird are in the hands of another collector. By sets I mean two eggs and upwards laid by one bird, in the same year and locality, but in the nests of different fsters. Here I should like to read an extract from the letter dated 7th December, 1915, sent by my correspondent along with the set of 5 just referred to. The first part bears out my statement that the female Cuckoo never wanders very far from her selected area. The second part gives my correspondent's opinion as to the number of eggs laid by a single Cuckoo in one year. "The 5 Cuckoo sets were all taken in an area of certainly not more than $1\frac{3}{4}$ miles long by perhaps 5 or 6 hundred yards wide, and mostly in one dike of varying width and depth, and I may add some under most exacting physical conditions. The Reed Warblers have been parasited by them now, to my knowledge, for 3 consecutive years, but in 1912, when I discovered the colony, it was very late in the season and only young birds were found. Judging by the number of eggs and young I have found and seen in the area in a single year, I am inclined to think that this Cuckoo (and therefore probably some others) may deposit more than their reputed number of 10-12 eggs. I traced 9 in 1913, and some portions of the reeds are absolutely unworkable by any means available to me. I trust these notes may interest you." It is not known at what intervals Cuckoos lay their eggs, but Mr. Chance gave it as his opinion that the 10 eggs just referred to were laid between the 1st and 25th of June, a period of 25 days. The eggs in my 10 set were found between the 24th May and 15th June—a period of 22 days. Although the egg of the Cuckoo frequently

resembles that of the foster in whose nest it is placed I do not believe it has the power to produce an egg of the same colour or type as that of the intended foster, any such resemblance being in my opinion purely accidental. There is a considerable variability of colour in Cuckoos eggs in general and a marked uniformity of colour in the egg of the individual bird. The Hedge Sparrow, which lays a blue egg, is a frequent foster, yet I am not aware that any well-authenticated blue egg has ever been found in this country. If the Cuckoo possessed the power of imitation to the extent some naturalists claim for it, one would naturally expect that the blue egg would be fairly common. A well-known collector died the other year and from his collection I was offered a blue egg taken at Barnham, Suffolk, along with 5 Pied Wagtails. The egg was certainly laid by a Cuckoo—and blue—but it was not a blue Cuckoo's egg. This may be a bit Irish, but what I mean is, it was not an egg of the blue type, and from an examination of the shell I came to the conclusion that it was laid by an old or diseased bird. It lacked the glossy colour of the true blue, and the indentations filled up with wax, to which I have already referred, were absent. If I could have removed the markings from some of the Cuckoo eggs in my own collection, I could have produced an exact duplicate. Blue eggs are frequently met with in Finland and Lapland. They are not only found in the nest of the Redstart, which lays a pale blue egg, but also in such nests as the Reed Bunting and Brambling and of course bear no resemblance to the eggs of either of these birds. After all the blue egg is only a type not a mimicry, for if a blue-laying Cuckoo dropped its egg into the nest of a Skylark it would not resemble the egg of that bird for it would still be blue. This also applies to another type found in the nest of the Orphean Warbler, which only by size and weight can be distinguished from that of the Warbler, so close is the resemblance. If the Orphean Warbler Cuckoo dropped its egg into the nest of a Hedge Sparrow it certainly would not be blue like that of the victim, because it had no power to alter its fixed Orphean Warbler type. Another type found in Hungary in the nest of the Great Reed Warbler is at present in process of evolution and will in time no doubt be exactly like the eggs of the foster. There is no manner of doubt about these eggs whatever. They are Cuckoo eggs and not abnormal eggs of the Warbler. Three eggs of this type and four eggs of the Warbler when weighed worked out as follows:—

The largest Reed Warbler's egg weighed 3 grains.

The smallest Cuckoo's egg $8\frac{1}{2}$ grains and the largest Cuckoo's egg 4 grains.

A great objection to this imitation theory is that the Cuckoo cannot mimic an egg it does not see. The case of the common Wren in whose nest it sometimes places its egg is a good example, as the construction of the nest makes it utterly impossible for the Cuckoo to see the colour of the egg or eggs the nest contains. The Reed Warbler is a more frequented foster, but I doubt very much if the colour of the eggs could be seen by the Cuckoo owing to the depth of the nest, so that mimicry is in this case also impossible. Such imitation requires reasoning

powers which no bird possesses, and a great deal more; for the bird might want to produce, say, a blue egg, but she has no control over the internal processes of her body, which result in producing such, and cannot do so.

The late Professor Alfred Newton, of Cambridge University, who wrote the article on the Cuckoo for the *Encyclopædia Britannica*, rejected with scorn the idea that individual Cuckoos had the power to vary their eggs in the least degree, the eggs laid by the same individual bird being, he held, always the same. Dr. John Rennie of the Aberdeen University, in his book "Aims and Method of Nature Study," is not so pronounced in his opinion. He makes the following observations: "The Cuckoo's egg has considerable range of colour and variation—that is, in a series. There is also what may be termed discontinuous variation—the pale blue egg—while this is so there is some evidence to show that the egg of the individual cuckoo probably does not greatly vary." His analysis of a series of 101 eggs gives the following result. "Sometimes—in twenty four cases—the normally-coloured Cuckoo egg resembles generally the egg of the foster bird. It is, however, usually easily recognised at first sight by the size. In 12 cases extreme variants of the egg resemble the foster-bird's egg. This includes 1 blue egg in a Redstart's nest. Sixty-five cases are indifferent; that is, there is no noticeable resemblance between the Cuckoo's egg and those of the foster parent." The authorities at The Natural History Museum, South Kensington, go a step farther than Dr. Rennie for you may read on a notice placed beside a case of Cuckoo's eggs the following:—"As a rule the egg of the Cuckoo agrees more or less nearly in colouring with the eggs of the birds among which it is laid, although this is less commonly the case when it is deposited in a Hedge Sparrow's nest. It is accordingly believed that each individual female Cuckoo is in the habit of selecting, when possible, the same species of bird to act as foster parent."

To disprove this mimicry theory I have collected 26 Cuckoo sets, and any one with the most rudimentary knowledge of birds' eggs, on examining these sets would at once admit that a more striking similarity in size, colour and markings could not be found. One set of 6 taken by a reliable and trustworthy collector were found in the nests of five different fosters, 2 in the nests of the Sedge Warbler and 1 each in the nests of Reed Warbler, Whitethroat, Lesser Whitethroat and Hedge Sparrow. The ground colour of the eggs is a bluish-grey with brown speckles fairly distributed. The nests were built by the side of a river and were all found within a stretch of a mile, so, as I have remarked before, the Cuckoo does not wander very far from its favourite area. The resemblance of one egg to another in this set is absolutely perfect and if they were not all laid by one bird the extraordinary similarity of the eggs would point to a coincidence which a field ornithologist would consider impossible in view of the variability of Cuckoo's eggs. When Dr. Rennie read a paper on "Egg-colouration in the Cuckoo and its bearing upon the theory of Cuckoo Sub-species,"

before the Royal Physical Society of Edinburgh, in October, 1918, he exhibited 13 of these sets—50 Cuckoo eggs—and made the following comments on this one. "What is the probability, we may pertinently ask, of 5 *distinct birds* in the same district all laying in the same season, each in a *separate foster species'* nest eggs so resembling each other in ground hue, depth and distribution of super-imposed pigment, that they cannot be distinguished from each other? Such is not likely to be the case; the probability is very remote." When I secured this set I thought it was impossible to improve upon it, but shortly afterwards I was fortunate enough to procure a beautiful and even more unique set of 11 in the nests of 4 fosters. One egg was taken in 1909 and 10 were taken in 1910. The fosters are two Reed Buntings, two White-throat, three Reed Warblers and four Sedge Warblers. Without doubt the eggs are all the produce of one bird for one egg cannot be distinguished from another. All the eggs have a pale russet zone round the large end, and when the 11 are laid out in a row one would imagine that some one with the aid of a ruler had neatly drawn a band across the lot and put on this delicate russet zone. On this set Dr. Rennie made the following comments:—"An unbiassed examination of these eggs and the foster clutches suggests the following observations:—

1. "There is a resemblance in colouration both as regards intensity and distribution which is remarkable.

2. "It is not surpassed nor even equalled in the colouration of the eggs composing the individual clutches in which the eggs have been found. There is noticeable variation in the different clutches of the same kind of bird's eggs, *that is*, Sedge Warblers, in this collection which contrasts with the uniformity of appearance of the Cuckoo's eggs of the series. We have here either the eggs of 2 or more birds, in which case a marvellous coincidence of colour resemblance extending to 11 eggs occurs; or the eggs are those of a single bird. If the latter alternative be correct, two facts of interest are to be noted. One is the confirmation of the observations of Baldamus and others that the resemblance in the eggs of the individual Cuckoo extends from one year to another. The second is that a single Cuckoo may lay as many as 10 eggs in a season, and that within so short a period as 22 days. Further, it will be noted there are four foster species involved; these, however, all nest in similar situations. The actual distance limit of this Cuckoo's ovipositing operations here considered was about 2 miles."

After all one may ask what advantage, if any, would be derived from mimicry? The fosters either cannot or do not attempt to eject the Cuckoo's egg; neither do they desert their nest, although it has been tampered with and some of the eggs removed. My own opinion is that the small size of the Cuckoo's egg contributes more to its safety than any apparant resemblance, real or imaginary, to the egg of the foster parent. All this evidence I think favours my opinion that the Cuckoo has no power of imitation whatever and shows that, like other birds, it always keeps to the same permanent type. Seebohm mentions

the case of a Guillemot which for 18 years in succession laid a very rare and highly prized egg on a certain ledge at Flamborough Head. In June, 1909, I found a Blackbird's nest near Waltham Abbey containing 4 very unusual eggs. On Good Friday, 1912, I again found the nest with 2 eggs exactly like those I found 3 years before, the bird still keeping to the same type, so it seems highly improbable that the Cuckoo should have the power to vary its eggs 10 or a dozen times in one year to match the colour of every new foster.

STRUCTURAL ABNORMALITIES IN LEPIDOPTERA.

By E. A. COCKAYNE, D.M., F.R.C.P.

References to abnormalities in insects are scattered through British and foreign periodicals, but they are often indexed in such a way that they can be found only by looking through the letterpress. The following attempt to collect and group those met with in Lepidoptera must be very incomplete. The grouping is provisional. A scientific arrangement is dependent on knowledge of the causes underlying structural abnormalities, and our knowledge of these is very slight. It is impossible even to separate abnormalities due to injury from inborn errors of development.

In spite of these deficiencies I hope this paper may be of some practical use for reference.

HOMOEOSIS.

This term was first used by Bateson for a change of some thing into the likeness of something else.

Przibram has extended its use, calling Bateson's examples substitutional homoeosis, and making two further classes "redundant or adventitious homoeosis" and "translative homoeosis." Most of the cases of substitutional homoeosis consist of the substitution of one organ by another which is homologous with it; redundant homoeosis covers cases in which duplication of an appendage occurs, but the extra appendage appears in the form of an appendage homologous with the one from which it springs. Homoeosis is very rare in insects, and since examples in other orders throw some light on those in Lepidoptera, I will mention them as well.

PART OF ANTENNA REPLACED BY TARSUS.

Zygaena, male. The right antenna short, with its club ending in two tarsal claws, like those on the feet of a *Zygaena*, but about half the size. They were polished and chitinous, light brown in colour with darker tips. The left antenna was very similar, but the naked claws were almost hidden by scales (Klemensiewicz, III. Wehenschr f. Ent., 1900, v., pp. 168, 169). This very remarkable anomaly has been recorded in other orders. In Hymenoptera, *Bombus variabilis*, Schmkr., male, the antenna replaced by tarsus (Kriechbaumer, "Ent. Nachrichten, Berl.," 1889, xv., p. 281).

Bombus agrorum, Latr. Similar condition (Doumerc, "Ann. Soc. Ent., France," 1834, iii., p. 171).

Halictus, with both antennæ formed like legs, of which only the femora and trochanters are missing. The tibiae have spurs and the tarsi small claws (Harling, "Zeitschr. f. Hymen u. Dipt.," 1903, jii.,

p. 208). *Cimber axillaris*. Antenna replaced in part by tarsus (Kraatz, "Ent. Zeitschr.," 1876, xx., p. 877. Figured by Bateson.).

Gastrophilus intestinalis, de Geer. Bedford found eight males and eleven females with abnormal and symmetrical antennæ, which appear to be like imperfect legs in structure. The best example has tarsi, bristles, ? pulvillum, and one terminal claw on each side.

(G. A. H. Bedford. Fifth and 6th Reports of the Director of Veterinary Research: Dept. of Agriculture, Union of South Africa, 1918, pp. 680-692, pl. 8, 14, 15, 16.)

Orthoptera.—Schmit-Jensen, amongst some young stick insects which were cannibalistic in habits, found one with the right antenna replaced by a small leg ending in a tarsus with claws. He amputated the antennæ in others and obtained regeneration, but a small tarsus replaced the lost end of the antenna, the part nearest the head was antennal in structure. He gives good photographs of these abnormal antennæ. (Homœotisk Regeneration af. Antennen hos en Phasme, *Carausius (Dixippus) morosus*. "Vid. Med. Kjöbenhavn," 1913, lxx., pp. 113-133.). His experiments suggest that injury is the cause of the condition, but give us no explanation as to why the regenerated part should be like a homologous appendage instead of a simple repetition of the lost part. The late Dr. T. A. Chapman successfully repeated this experiment.

ANTENNA REPLACING LEG.

I do not know of a simple case of substitutional homœocosis of this nature, but one of adventitious homœocosis is on record in a Dipteron.

Dilophus tibialis, Loew. The fore coxa of the right side has a long jointed extra appendage inserted on its anterior face near the distal extremity. It is black except for the bases of the first and second joints, which are red like the coxa. All the joints are covered with short black hairs. There are nine, not ten joints as in the normal antenna, but there is some evidence that the last joint may be two fused together, and the whole is longer than a normal antenna. It is probably a case of reduplication, the extra appendage taking the form of the homologous appendage of another segment. (Wheeler, "Arch. Entwickelmech.," 1896, iii., pp. 261-268, fig.: Escherich, "Ent. Nachr.," 1896, xxii., pp. 259-261.)

ANTENNA REPLACING EYE.

I do not know of a case in Lepidoptera, but there are examples in Diptera. *Syrphus arcuatus*, Fall. (Osburn, "Insect Science," 1918, xxvii., p. 67.)

"Squat" mutation of *Drosophila melanogaster*. Amongst other features the head is flat and quite often the eye has a protruding lump which is caused by an extra antenna pushing partly or entirely through. This mutation, which has been lost, was a dominant not sex linked. (C. B. Bridges and T. H. Morgan, "The Second Chromosome Group of Mutant Characters." Publication No. 278, Carnegie Institution of Washington, p. 284). It has been recorded also in a lobster.

MANDIBLE REPLACING MAXILLA.

Panesthia sinuata, a cockroach, with the right maxilla replaced by a mandible, is figured by Shelford. ("Proc. Ent. Soc. Lond.," 1907, p. xxxiii.)

The antennæ, eyes, mandibles, maxillæ, and the three pairs of legs, are all homologous appendages belonging to different segments, so that the substitution of any one of them by any other would be a straightforward case of homoeosis. The legs and wings are not considered to be homologous organs, and replacement of one of these by the other is a most surprising and inexplicable phenomenon. The following examples may be extra wings arising near the point of origin of the leg and preventing it from developing, or instances of homoeosis revealing an unsuspected homology between wings and legs.

WINGS REPLACING LEGS.

Zygæna jilipendulæ, L. The left hind leg (metathoracic) is replaced by a hindwing, rather small and pale, but normal in other respects. It is described by Richardson, who bred it ("Proc. Ent. Soc. Lond.," 1891, p. x.), and is described and figured by Bateson, who gives a diagram of its neurulation ("Materials for the Study of Variation," p. 148), and is also figured by Barrett ("Brit. Lepidopt.," Pl. 60, fig. i.k.).

Parasemia plantaginis, L., with the hind pair of legs replaced by miniature wings. (W. Woodward, "Ent.," 1896, xxix., p. 334.)

There is a doubtful example of the reverse phenomenon in a beetle, *Prionus cortarius*, which is stated to have had the elytra replaced by legs. ("Stett. Ent. Zeitg.," 1840, i., p. 48.)

PENCIL OF HAIRS REPLACING LEG.

Cucullia chamomillæ, Schiff. This insect had a long brush of yellowish brown hairs arising in place of the right hindleg. They lay along the first abdominal segment. The whole insect is figured, and there is a separate figure of the brush of hairs. The point of insertion was unfortunately damaged. (Przibram, "Arch. Entwickmeh.," 1910, xxix., pp. 588-614.) It is not clear what appendage homologous with a leg this pencil of hairs represents, if it represents one at all.

WINGS REPLACING PATAGIA.

Gelechia distinctella, Z., male, with six wings. An extra pair of wings, full-sized and symmetrical, arose from the prothorax, and the patagia were absent. It was taken in the Radomer Government of Russia, and described by Tarnani, and regarded as a case of atavism. ("Zap. Inst. Selisk. Choz.," 1906, xviii., pp. 106-134.) Redescribed and figured by H. Schultz in a paper, in which he brings forward arguments to prove that the patagia represent a pair of prothoracic wings. ("Deutsch. Ent. Zeitschr.," 1914, p. 19.) According to Brogniart certain fossil insects possess a pair of prothoracic in addition to the meso- and metathoracic pairs of wings. (Note sur quelques Insectes Fossiles du Terrain Houiller qui présentent au prothorax des

appendices aliformes, "Bull. Soc. Philom. Paris," 1890). The six-winged *Gelechia* is to be regarded as an example of substitutional homoeosis.

FOREWING RESEMBLING A HINDWING IN STRUCTURE AND PATTERN,
OR VICE VERSA.

This group is less remarkable and commoner than the groups mentioned above. The majority of the examples occur in *Zygaenidae*.

Zygaena occitanica, Vill., bred from a larva by Boisduval. ("Bull. Soc. Ent. France," 1853, 3rd ser., i., p. lxviii.) This is figured by Oberthür ("Études," 1896, xx., p. 53, Pl. vii., no. 123).

The right hindwing is replaced by a wing almost identical in structure and colouring with the forewing. The pattern is slightly different, the apex of the wing is more rounded, and the neuration is slightly abnormal.

Zygaena exulans, Hoch., with left hindwing replaced by a forewing. (Wiskott, "Iris," 1897, p. 391, Taf. xii.) The neuration, which is not quite like that of a forewing, is figured by Przibram.

Zygaena carniolica, Scop. Mödling, 30, vii., 1905, Wagner. Hofmuseum, Wien. Male with left hindwing like a forewing. Figures of the pattern and neuration show that they differ a little from those of a normal forewing. (Przibram, "Arch. Entwicklmech," 1910, xxix., pp. 588-614.)

Zygaena filipendulae, L. "Mr. Capper has one with one of the hindwings exactly like a forewing, both in shape and colour, and I believe other similar ones exist." (Mosley, "Nat. Journ.," 1896, v., p. 20.)

Zygaena lonicerae, Esp., with the left hindwing like the forewing in colour and markings. Captured by C. Hewitt, York. ("Ent. Record," 1890-91, i., pp. 59-60.) The following description probably applies to the same specimen. Right side nearly normal, hindwing a little shortened and quite pointed. The left hindwing is a duplicate of the forewing, being of nearly equal length and having the same rich blue-green colour and red spots. Apex slightly more rounded, and base of costa somewhat arched instead of straight. ("Ent. Month. Mag.," 1895, xxxi., p. 219. Capper Coll.) The specimen in Lord Rothschild's collection is probably the same, but the label is insufficient to identify it.

Zygaena trifolii, Esp. This insect has two wings on the left side resembling forewings, one meso- and one metathoracic, but the forewing on the right side is rather smaller and narrower towards the apex, and there is no hindwing. (Christy, "Ent.," 1894, xxvii., p. 253.)

Zygaena filipendulae, L., with normal wings on the right side, but on the left side two wings resembling hindwings, the foremost occupying the position of a forewing. ("Ent.," 1912, xlv., p. 106.)

Adela viridella, Scop. Franz Hauden, May, 1907. Hofmuseum, Wien. The right hindwing is entirely of the golden-green colour of a forewing, and the long cilia of the posterior border are absent as in a forewing. The frenulum is present. The shape is intermediate between that of a fore- and a hindwing, and the neuration also, but the latter approaches

more closely to that of a forewing. Figures of the insect and of the neurulation are given by Przibram ("Arch. Entwicklmech," 1910, xxix., pp. 588-614).

The following examples differ in that the shape and neurulation is normal for a wing arising from that segment of the thorax, from which the abnormal wing arises, with one exception. The substitution of colour and pattern is only partial, and affects only one surface.

PAPILIONIDÆ.—*Papilio bianor*, Cram. Captured in China, 1887. There is a patch of the colour and ornamentation proper to the under surface of the hindwing on the under surface of the right forewing. ("Proc. South Lond. Ent. and N. H. Soc.," 1888, pp. 39-40.)

Papilio glaucolans, Bates, subsp. *melaenus*, Rothschild and Jordan, male. Storch Coll. Stichel gives a full description and photograph of this insect. On the undersurface of the left forewing a large part of the space between nervures R8, M1, M2, and SM1 (Rothschild and Jordan's nomenclature), is occupied by the markings and colour of a hindwing between the corresponding nervures. Between SM1 and SM2 the oblique black stripe, which should run from the costa without a break, but is interrupted by this abnormal patch, is continued. The red colour of a hindwing has the same relation to nervures in this forewing as in a normal hindwing, and between M1 and M2 the elaborate pattern and colouring of the marginal and submarginal lunules, found between M1 and M2 of a hindwing, are accurately reproduced. ("Berl. Ent. Zeit-chr.," 1908, liii., pp. 199-201.)

Parnassius apollo, L., male. South Tirol, 1909. A complete streak, with the colour and pattern of the forewing in the right hindwing. ("Frings, Soc. Ent. Zurich," 1911, xxvi., p. 11.)

Parnassius apollo, L., female. Patches of forewing colour in hindwing. (Frings, *ibid.*)

PIERIDÆ.—*Euchloë cardamines*, L., male. An irregular orange patch extending to the margin of the left hindwing, opposite the discoidal area, and a small orange speck near it. (Rye, "Handbook of the British Lepidoptera." Coloured Plate.) It bears the same relation to nervures as a portion of the posterior part of the orange tip of the forewing.

Pieris brassicae, L., female. Brighton, 1898. There is a large area of the white colour of the underside of the forewing, in the middle of the underside of the right hindwing. The edges of the patch are irregular, and there are small specks of white in the deep cream colour of the normal part round the edges of the main area of the white. Both the large black spots of the forewing pattern are reproduced in the hindwing, one between nervures 1b and 2, the other between 3 and 4. Their position is the same in relation to the neurulation as the spots in a forewing. The neurulation is normal, except that nervure 4 is curved backwards opposite the anterior spot. The upperside is normal and the wing is fully expanded. (Rothschild Coll., Tring Museum.)

SATYRIDÆ.—*Coenonympha pamphilus*, L., with small patches of upperside colouration on the underside of the left hindwing. ("Trans.

Lond. N. H. Soc.," 1915, p. 18.) These are probably patches of the colour of the underside of the forewing, and not the upperside.

Coenonympha pamphilus, with two narrow streaks of upperside colouration, or more probably of the underside colour of the forewing, on the underside of one hindwing. Taken by the late Mr. A. J. Scollick, on Headley Common, May 27th, 1915. I am indebted to Mr. H. B. Williams for the description of this specimen, which he saw captured.

Coenonympha pamphilus, with patch of upperside colouration on the underside of the left hindwing. Maddison Coll. (H. B. Williams, "Trans. City of Lond. Ent. Soc.," 1912-1913, p. 56.) This is probably another example of the underside colour of the forewing on the hindwing.

Coenonympha pamphilus. The colour and pattern of the underside of the left forewing is reproduced over a large part of the left hindwing. The tawny ground colour covers most of the wing as far forward as nervure 3 and three-quarters of the discoidal area. Normal colour and pattern is found between 3 and 4, except at the extreme base. Between 4 and 5 forewing colour and pattern reappears. A narrow ocellus touches 5. It has a white centre and is surrounded by a pale ring, except at the point where it touches the nervure. The normal ocellus occupies the space between 5 and 6 in the forewing, but the black part encroaches on that between 4 and 5, and the pale ring extends halfway between 4 and 5. I think the ocellus in the hindwing represents the posterior part of a forewing ocellus. The only objection to this view is that it has a white centre. The anterior part of the wing is normal. The neurulation is normal and the upperside shows the usual colour and markings. The posterior border of the wing is a little crumpled. I am indebted to Mr. A. W. Mera, the captor, for the loan of this specimen. (Plate I, figs. 5 and 6.)

Epinephle jurtina, L. The upperside is normal. There is an additional vein from the discoidal area in the right hindwing. On the underside of this wing a yellow stripe runs across the discoidal area, and over the extra nervure, ending in a large ocellus. The colour and pattern resembles a patch of the upperside of the forewing. It was taken near Oxford in 1877, and is in the Hope Collection. (Westwood, On some unusual Monstrous Insects, "Trans. Ent. Soc. Lond.," 1879, p. 219, Pl. vi.) There is a good coloured plate, which shows that the patch is of underside colouration, and a diagram of the neurulation. If we take the nervure marked X in the diagram, and regard it as the normal nervure 5 instead of considering it to be the extra nervure, and regard the nervure marked c as the extra nervure, the big ocellus falls into the posterior half of the large space between 5 and 6, and the small normal ocellus of the hindwing falls into the anterior half. They are divided by the extra nervure. In a normal forewing the big ocellus fills the whole space between 5 and 6, and in a hindwing the small ocellus lies in the middle of the space between 5 and 6.

This interpretation of the neurulation makes the abnormal ocellus in

the hindwing fall into a position homologous with that occupied by the ocellus of the forewing.

Erebia goante, Esp. Dr. Chapman told me that with the late Mr. J. W. Tutt, he took two specimens at Arolla, with upperside markings, in one case freely reproduced, on the underside. Both were destroyed in the journey down. It is probable that they were underside markings of one wing reproduced on the other. It is remarkable how often it has been stated that an upperside patch has appeared on the underside. But in every case examined this has proved to be an error.

LYCÆNIDÆ.—*Rumicia phlaeas*, L., taken by Corbett at Doncaster, September, 1895. There is a large sharply defined wedge-shaped area of the colour and pattern of the underside of the forewing on the underside of the left hindwing, lying between nervures 1b and 4.

It includes half the spot between 1b and 2, that between 2 and 8, and part of that between 8 and 4. The dark submarginal band between 1b and 2, and between 8 and 4, is reproduced, but a wedge of normal hindwing colour extends too far inwards for it to appear between 2 and 8. All the markings occupy positions in relation to the nervures homologous with those occupied by the corresponding markings of a normal forewing. The upperside is normal and the wing fully expanded. The specimen is incorrectly figured by Mosley ("Nat. Journ.," 1898, vii., p. 26), and inadequately described by Tutt ("Brit. Butt.," vol. i., p. 354), and the colour is described as copper, implying that it is a patch of upperside colouration. (Corbett, "Ent. Rec.," 1896, vii., p. 112.) It is now in Mr. P. M. Bright's collection, and he kindly allowed me to examine it. (Plate I., figs. 1 and 2.)

Rumicia phlaeas, L., with a small patch of copper with a black spot in it on the underside. South, I. of Wight. (South, "Butt. of Brit. Isles," p. 153; Tutt, "Brit. Butt.," vol. i., p. 355; "Proc. South Lond. Ent. and N. H. Soc.," 1888, pp. 39-40.) This is probably an example of the colouration and pattern of the underside of the forewing on the underside of the hindwing.

Rumicia phlaeas. Ocellus on underside of left hindwing, like marginal ocelli on underside of forewing. North Devon, 1881. ("Proc. South Lond. Ent. and N. H. Soc.," 1888, pp. 39-40.)

Rumicia phlaeas. On the underside of both hindwings a very large area shows the colour and markings of the underside of the forewings. Both areas are broken up by thin streaks of normal hindwing colour. The upperside and the neurulation are normal. The relation of markings to nervures in the hindwings is the same as in a forewing, each spot occupies the interneural space homologous with that occupied by the corresponding spot in a forewing. Taken by A. Quarrington, Purley. Bright Coll. (Plate I., figs. 3 and 4.)

Rumicia phlaeas. Underside of right hindwing marked by red dashes from base to exterior margin. ("Bull. Brooklyn Ent. Soc.," ii., p. 8; Tutt "Brit. Lepidopt.," vol. viii., p. 355.)

HETEROCERA.—ARCTIADÆ.—*Arctia caia*, L. Left upper wing marked with two nearly parallel streaks of the same colour as the underwings, crossing the other colours of the wing from the base to the posterior

margin. The underside is not mentioned. (Shepherd, Allis Coll. "Proc. Ent. Soc. Lond.," 1855, vol. iii., n.s., p. 80.)

Arctia caia with extraordinary wedge-shaped mark extending from outer margin to base of left hindwing, and a small spot also on same wing, in colour brown and white. They appeared to have been taken out of forewing and inserted into hindwing. J. A. Clark, Abbott's Wood, Sussex, July, 1892. ("Proc. Ent. Soc. Lond.," 1894, p. xvi.)

Arctia caia, male. In the right hindwing there is a streak of forewing colour, extending almost from the base to the outer margin. It reproduces part of the two outer brown markings, which lie along the posterior border of the forewing, with the white ground between and beyond them. The inner part of the blue-black spot near the anal angle is replaced by the brown colour of the forewing, and part of the posterior and anterior part of the next blue-black spot. A streak of white runs from this spot to the outer margin, separated from the rest of this part of the forewing pattern by a red streak. The middle, posterior, and outer parts of the anterior of the three outer black spots of the hindwing are replaced by brown, reproducing part of the brown marking along the costa of the forewing. The apex of the hindwing is occupied by a reproduction of part of the apical brown marking of the forewing, and between this and the other brown patch is a small white area. The small speck of brown in the outer part of the black spot is connected to the outer margin by a white streak. The underside and venuration are normal. The posterior margin of the wing is a little crumpled. The markings correspond to forewing markings, and appear to occupy homologous positions with regard to nervures. (Rothschild Coll., Tring Museum.)

Arctia caia, with a sprinkling of red in the white bands of the forewings, and also projecting into the brown markings. ("Berl. Ent. Zeitschr.," 1911, lvi., p. (31).)

Arctia caia, with the red colour and the black spots of a hindwing sprinkled over one forewing. The hindwing was normal and there was no deformity. (Frings. "Soc. Ent. Zurich," 1911, xxvi., p. 11.)

Arctia caia. Hindwings Normal. Forewings with dashes of red and some dark spots blue-centred. The coloured figure shows four spots of hindwing pattern in the right forewing, but their position and shape does not quite correspond with that of the hindwing spots. The other side is not figured. Gregson took two larvae at Pont-y-Mawn, North Wales, which produced this and a very similar specimen. ("Nat. Journ.," 1897, vi., p. 28, pl. xviii., fig. 7.) The figure of this, like the other example of homoeosis given by Mosley, may be inaccurate.

Pericallia matronula, L. The right hindwing is narrower than the left, and incompletely expanded near the posterior margin. A strip with the orange and black markings of the hindwing runs along the anterior margin in front of the subcostal nervure and nervure 6, and another normally coloured strip runs along the posterior border. Between these the greater part of the wing is of the brown and white colour of a forewing, the markings being arranged in the same relation to the nervures as in a forewing. The posterior part of each of the

three big white costal markings lies just behind the subcostal nervure as it does in the forewing. The posterior part of the white basal patch appears just behind the median nervure, and part of the white spot just behind nervure 2 reappears in the same situation in this hindwing. Scattered over this abnormal part of the wing are small patches of orange and black, each in the position orange and black should occupy in a normal wing. ("Iris," 1912, xxvi., p. 281, pl. vii.) (Plate I., fig. 8.)

NOCTUIDÆ.—*Mamestra (Hadena) thalassina*, Rott. The specimen is normal except on the upperside of the left hindwing, where there is a stripe 2mm. wide, running from the base to the outer border, in colour and pattern exactly like part of the forewing. Kabis, Schwartzwald, July. ("Illustr. Wochenschr. f. Ent.," 1899, iv., p. 29.)

Leucania conigera, Fab. The left hindwing is normal in shape, but in colouration and structure in part resembles the upper wing. The coloured figure shows no abnormality in neuration. There is a discal white spot, and a dark submarginal line bent outwards at nervure 4, as in a forewing. Taken by W. P. Smith, near the Welsh Harp, Middlesex, July, 1877. ("Ent.," 1878, xi., p. 169.)

Pachnobia hyperborea, Zett. A radial segment of the hindwing reproduces the rich colour and markings of the forewing. ("Ent. Record," 1910, xxii., p. 266.)

Taeniocampa gothica, L. This is described quite incorrectly ("Proc. South Lond. Ent. and N. H. Soc.," 1915-1916, p. 92). The specimen is a male, taken by the late Mr. Stallman at Oxshott, April 17th, 1911. His brother kindly allowed me to examine it. There is a strip on the upper surface of the left hindwing occupying most of the space between nervures 1 and 2, in which the dense scaling, colour, and pattern of a forewing between the two corresponding nervures is accurately reproduced. The neuration and the underside are normal. The wing is of the shape of a hindwing, of full size, and not deformed or crumpled. (Plate I., fig. 7.)

Neuronion cespitis, Fab. On the upperside of the right hindwing the whole central part, from base to outer margin, resembles a forewing in colour and pattern. Cells 1a and 1b, and 7 and 8, are whitish, like a normal hindwing. The shape of the wing is that of a hindwing, and it is fully expanded. Taken near Carlsbad, 1900. (O. Schultz, "Berl. Ent. Zeitschr.," 1901, xli., p. 15, fig.)

Catocala nupta, L. Streaks of red of the same colour as that of the hindwings on the forewings. Howard Vaughan Sale. ("Nat. Journ.," 1898, vii., p. 82.)

Zygaena minos, Schiff., with an additional wing on the left side, inserted between the two normal wings, is considered by Przibram to be an example of adventitious homoeosis because the colour is that of a forewing, but the structure is more like that of a hindwing. I have included it in the list of examples of an extra wing with the reference to Rogenhöfer's description and figure.

Westwood thought that his *E. jurtina* was an example of extra wing formation, but a study of the examples recorded more recently, makes

it evident that they are cases of homoeosis. In those most carefully described the pattern proper to an area of one wing is reproduced in the homologous area of the other wing, and on the same surface.

It is possible that incomplete or inaccurate descriptions and drawings account for any exceptions. In the genus *Zygaena* there is an almost perfect reproduction of the shape and neuration of a forewing in the aberrant hindwing, as well as its colour and pattern, or vice versa. In *Adela* the shape and neuration are intermediate, but as in *Zygaena* the whole of the wing is altered.

In all the others the shape and, with one exception, the neuration are unaltered, and the colour and pattern are only changed over a part of one surface of the affected wing or wings. Five are bilateral. In very few is the abnormal wing small or crumpled, but this does not disprove the possibility that they all originate in some small injury, and are really examples of homoeotic regeneration. Even if this is so, we cannot explain why in rare instances a part should be regenerated in the likeness of an homologous part instead of its own likeness.

Of the 40 collected records seven occur in the genus *Zygaena*, one in the *Tineidae*, four in the *Papilionidae*, two in the *Pieridae*, seven in the *Satyridae*, five in the *Lycaenidae*, eight in the *Arctiidae*, and six in the *Noctuidae*. Though the numbers are small the frequency of this anomaly in some families and its absence in others must be more than a mere coincidence. This is still more striking when we realise that half the known cases have occurred in five species, seven in *Arctia caia*, four in *Coenonympha pamphilus*, five in *Itimicia phlaeas*, and two each in *Parnassius apollo* and *Erebia goante*.

HOMOEOSIS IN A LARVA.

Hart records a larva of *Chaerocampa elpenor*, L., with three well-marked eye spots on each side instead of two, and with a rudimentary caudal horn. He does not state whether the extra pair occurred on the segment anterior to the first pair or posterior to the second pair. ("Irish Naturalist," 1918, xxvii., p. 172.)

ERRORS OF METAMORPHOSIS.

- (1) Delayed or incomplete metamorphosis. The appearance of larval characters in the pupa or imago, or pupal characters in the imago.
- (2) Precocious metamorphosis or Protethely. The appearance of pupal or imaginal characters in the larva or imaginal characters in the pupa.

(1) Dr. Chapman by feeding larvæ of *Triphaena comes*, Hb., on unsuitable food (arbutus) obtained a larva, which instead of pupating continued as a larva for a further instar, grew to great size and then died. This species is usually constant in the number of ecdyses, and had a critical examination been made pupal characters might have been found. He repeated the experiment and some larvæ reached full growth and then prepared for a further ecdysis. Most of them failed

to 'cast their skins, and those which succeeded refused food. All of them showed some pupal characters in the antennæ, maxillæ, eyes and prolegs. ("Ent. Month. Mag.," 1896, xxxii., pp. 54-80.) They are to be regarded as pupæ with larval characters rather than larvæ with pupal characters.

Powell records a parallel case in *Papilio alexanor*, Esp. One larva passed into a sixth stage instead of pupating. The head and prolegs were very large and the mouth parts abnormal. It fed with difficulty, was clumsy in its movements, and finally died. It was not examined critically for pupal characters. ("Ent. Record," 1904, xvi., p. 68.)

Chapman describes and figures a pupa of *Hastula hyerana*, Mill., with jaws of larval pattern, but with a rough surface instead of the polished surface of the normal larval jaws. This is now in the teratological collection of the British Museum. ("Trans. Ent. Soc. Lond.," 1907, p. 173, pl. xii.)

Larva with pupal antennæ. (Lindner, "Zeitschr. f. Wiss. Insekt. Biol. Berlin," 1915, xi., p. 244.) This paper is not available.

Clément describes a pupa of *Smerinthus (Mimas) tiliae*, L. Taken at Issy-les-Moulineaux, in 1896, which had a well-developed caudal horn on the 12th segment. The imago bred from it had a long bristle-like process in the same position. He also mentions a pupa of *Deilephila euphorbiae*, L., with a similar caudal horn, but there was no trace of this structure in the imago. He figures both the pupa and imago of *S. tiliae*. ("Bull. de la Soc. Ent. de France," 1898, xiii., p. 268.)

M. Muller gives figures and a long description of a moth which is evidently *Psilura monacha*, L., found sitting on a plant of *Epilobium montanum*, on June 28th, 1762. There was a triangular brownish area on the front of the head, which was transparent, and through which one could see a clear liquid in continual movement. The head differed slightly in other respects from a normal larval head. He states that it was able to move its mouth parts. It laid a number of infertile eggs, and died on August 6th. If the mouth parts were really mobile this must be regarded as a genuine case of larval characters in an imago. ("Mém de Mathém et de Phys. présentés à l'Acad. Roy. des Sciences de Paris," 1774, vi., pp. 508-511.)

(2) Jones describes and figures a larva of *Melanippe montanata*, Schiff., one of twelve, which grew much faster than the others, and in its last instar was possessed of imaginal prolegs and pectinated antennæ. The latter were of gelatinous consistency, and as they began to shrivel and the larva appeared moribund, it was killed and preserved. ("Ent.," 1888, xvi., p. 121.) Harrison describes a larva of the hybrid *Oporabia dilutata* ♂ × *O. autumnata* ♀. It was one of a brood, fourteen of which in their penultimate instar, instead of moulting normally, spun silken pads and remained motionless for a fortnight. Thirteen died owing to interference by other larvæ caged with them, but the fourteenth, which had been isolated, moulted after five weeks and showed imaginal characters. It had a very small head with many jointed antennæ, eyes with both imaginal and larval characters, and four rudimentary wings with vestiges of imaginal neurulation, one 3mm.

long and three 1.75mm. long. The legs showed indications of imaginal structure. ("Journ. of Genetics," 1920, ix., no. 3, p. 268.)

Cesare Majoli, in 1813, had some larvæ of *Bombyx mori*, L., which, after the fourth ecdysis, had the thorax partly larval and a larval body, but the head was small with small black eyes and imaginal antennæ, and from the thorax sprouted rudimentary wings. ("Proc. Ent. Soc.," 1879, pp. 222-228.)

In 1879 a specimen thought to be *Orgyia antiqua*, L., was exhibited, which showed a mixture of larval, pupal and imaginal characters, but no adequate description is given. Winneguth records six abnormal larvæ of *Dendrolimus pini*, L. ("Insektenbörse," 1902, xxxvii., pp. 290-291.) One pupated and a small male emerged. These larvæ had imaginal characters in the antennæ, maxillæ, and prolegs. Kolbe gives a full description with numerous figures. ("Allgem. Zeitschr. f. Ent.," 1903, viii., pp. 1-9 and 25-30.)

Dewitz experimented with larvæ of *Pieris brassicae*, L., injecting them with acetic acid, 1 in 100, or strong sodium chloride. After one injection he had many larvæ, which did not pupate, but reached an intermediate stage between larva and pupa. They had the form of the larva, but the abdomen approximated to that of the pupa. The head and thorax wholly larval. One lived for a fortnight in this condition. I am not clear whether this is an example of retarded or precocious development. ("Arch. f. Anat. u. Physiol., Leipsig, Physiol. Abt.," 1902, p. 327.)

The phenomenon of anticipation has been noted in the case of minor characters by Harrison and Denso, in hybrid Sphingid and Bistonine larvæ. ("Zeitschr. f. Insektenbiol.," 1908, iv. (xiii.), pp. 128-135, 170-176, and 201-208.) The whole subject is discussed by Kolbe and Peyerimhoff.

It is much commoner in Coleoptera.

Larvæ with wings have been found in *Tenebrio molitor* (Heymons, "Sitz. Ber. Ges. Nat. Freunde," 1896, pp. 142-144), *Anthrenus varius* (Busek, "Proc. Ent. Soc. Washington," 1897, iv., p. 123), *Dendroides canadensis* (Riley, "Ent. News. Phila.," 1908, xix., no. 9, pp. 136-137), *Malthodes* (Peyerimhoff, "Bull. de la Soc. Ent. de France," 1911, p. 327), *Cantharis* (Trägårdh, "Fauna och Flora," 1912, pp. 245-255), *Telmophilus typhæ*, Fall. (Kemuer, "Ent. Tidskrift," 1914, xxxv., pp. 86-95), and *Photurus pennsylvanica* ("Psyche," 1914, xxi., p. 126).

Arendsen Hein states that in almost every large culture of *Tenebrio molitor* larvæ with wings occur, but only in the case of those with an abnormally long life. ("Journ. of Genetics," 1920, x., no. 3, p. 229.)

Although Coleoptera, like Lepidoptera, are holometabolous insects, their wing development is less complicated, and the appearance of rudimentary wings in their larvæ is less remarkable.

An abnormality which I cannot explain or classify is Chapman's pupa of *Pieris brassicae*, L., which had a double pupal skin. The inner skin was thinner but normal in structure, even to the possession of cremasteric hooks. ("Ent. Month. Mag.," 1917, 3d ser. iii., pp. 196-197, plate.)

Although failure to complete an ecdysis is in no way comparable to a true error of metamorphosis, it is convenient to mention this next.

A larva sometimes fails to cast the old covering of the head, and with the new mouth parts imprisoned dies of starvation. Chapman figures an example in *Amorpha populi*, L. ("Ent.," 1906, xxxix., p. 217).

Sometimes the pupa retains the old covering of the larval head. Richard Lang figures a pupa of *Sphinx ligustri*, L., with a larval head and the three pairs of larval prolegs still attached ("Allg. Zeitschr. f. Ent.," 1904, ix., p. 224). I have a pupa of *Epinephele tithonus* with larval head. Numerous instances of imagines with larval heads are on record, and some have been dissected to show the skin of the pupal head, and the head of the imago with rolled up antennae within.

Wesmael describes a case in *Limenitis populi*, L., which he dissected, and figures it ("Bull. de l'Acad. des Sc. Brux.," 1838, iv., p. 359). Kolbe gives examples in his paper on protethely. Many are cited in "Proc. Ent. Soc. Lond.," 1837-40, ii., p. lxix., and "Trans. Ent. Soc. Lond.," 1879, pp. 222-228, including examples in *Bombyx mori*, *Zygaena exulans*, and *Mimas tiliae*. Two examples in *Z. lonicerae* and *Z. trifolii* are mentioned in the "Entomologist's Record," 1890-91, i., p. 174. One in *Pyrameis atalanta* and another in *Gastropacha quercifolia* are recorded in the "Entomologist," 1870-71. Last year I bred a *Pyrameis atalanta* in this condition.

A specimen of *Aglais urticae* with larval head was caught flying in a "normal" way by J. Clark ("Ent.," 1872-73, vi., p. 221). Another is recorded by Speiser ("Ill. Zeitschr. f. Ent.," 1899, iv., p. 155), and one in *Limenitis sibylla* by Schnepf ("Intern. Ent. Zeitschr. Guben, 1909, iii., p. 160).

REVERSED POSITION IN PUPA.

Saturnia pavonia, L., a fresh imago was found with the anal end protruding from the split cephalic end of the pupa case inside a well-formed cocoon. (Speyer, "Stett. Ent. Zeitung.," 1860, xxi., pp. 369-371.)

Deilephila euphorbiae, L. A specimen in the same condition as the last is described and figured. (Bauer, "Allg. Zeitschr. f. Ent.," 1902, vii., p. 110.)

Bombyx mori, L. Two specimens, a male and a female, were found firmly fixed in a single pupa case, with the heads towards the anal end of the pupa case. The female lived ten days and laid eggs, the male lived twelve days. They are stated to have been the product of a single larva of normal size and appearance, one of a family of six, from which seven imagines were produced.

The specimen was shown at the Entomological Society, but no explanation was offered. The emergence of two imagines from a single larva seems incredible. (E. Kay Robinson, "Ent.," 1881, xiv., p. 198, fig. .)

The reversal inside the pupa case during development is a genuine one. Newstead reported it in a fly, *Auchmeromyia luteola*, and more recently Macarthur found six *Calliphora erythrocephala* reversed in the

puparium, with the head of the imago towards the posterior spiracles. The pupal case was ruptured at the usual site, but the flies could not free themselves. They were found amongst several thousand normal ones. In 500 pupæ dissected later one was found lying reversed inside a pupa case, which was unbroken before dissection. ("Journ. R.A.M.C. Lond.," 1921, xxxvi., pp. 282-283.)

AXIAL DUPLICITY.

A single fertilised ovum sometimes gives rise to two individuals, owing to complete separation of the two first hemispheres of a dividing egg. In mammals this phenomenon is not uncommon, and the two individuals formed in this way are known as homologous or identical twins. In insects I know of no case in which two larvæ have hatched from one egg. Division may be incomplete and affect the anterior or posterior part of the embryo. Instances of this are well known in vertebrates, and are commonly known as double monsters.

Loeb has shown that the temporary immersion of the eggs of the sea urchin in lime-free sea-water results in the production of 90% of twins. Centrifugalisation of duck's eggs causes the production of a high percentage of double monsters.

Abnormal physical conditions causing delay at an extremely early period of development appear to be the true cause of this form of twinning and of double monsters. The conditions in the egg stage of Lepidoptera and other insects must be unfavourable to their production. I know only four records in Arthropods, two of which refer to insects. One of these is a gnat larva (*Chironomus*) with two heads and with the anterior part double to the fifth segment (Weyenburgh, "Stett. Ent. Zeitung," 1873, xxxiv., p. 452, fig.). The other is a larva of *Thaumtopoca pinirora*, Tr., found wild at Swinemunde. The hind part branched into two normal sized extremities, each with a normal pair of hind claspers. It pupated successfully and produced a gynandromorphous imago, male on the left side and female on the right. It is recorded in Schultz' list of gynandromorphs of Palearctic Lepidoptera. ("Ent. Zeitschr. Stutt.," 1907, xx., p. 242.)

ABNORMAL SEGMENTATION.

SPIRAL SEGMENTATION.—This phenomenon is well known in Annelids, and is discussed by Bateson in his "Materials for the Study of Variation," p. 158. In the Teratological Collection of the British Museum there is an example in a larva of *Hypocrita jacobaeae*, L. The first six segments are normal, the seventh and eighth form a continuous spiral from right to left, and the rest are normal. It is labelled Champion, 1918. I believe there is a record of two or three similar specimens in this species, all taken at the same time. There is also a record in *Deilephila (Celerio) euphorbiae*, L. The fourth, fifth, and sixth abdominal segments were fused into a continuous spiral in the pupa and imago, both of which are figured. (Christeller, "Ent. Mitt.," 1917, vi., p. 15.)

Amongst other anomalies of segmentation in the larva of *Tenebrio*

molitor, Arendsen Hein figures an example of spiral segmentation ("Journ. of Genetics," 1920, x., p. 280). A second example in Coleoptera is in *Stenocorus fasciatus*, F., with three segments in the spiral. (Scholz., "Ill. Zeitschr. f. Ent.," 1900, v., p. 298.)

FUSION OR DEFECT OF SEGMENTS.—Larva of *Bombyx mori*, L. The seventh and ninth segments met on the dorsum, the eighth was deficient and formed a swelling on each side. There was a depression at the point of contact of the seventh and ninth. The third clasper on the left side was absent and the corresponding spiracle small. The larva died before pupation. (Bassi, "Ann. Soc. Ent. France," 1852, x., 2nd s., p. ix.) Larva of *Catocala unijuga*, Walk. Fusion of second and third abdominal segments on the right side, so that there were three claspers on the right and four on the left. (Dadd, "Berl. Ent. Zeitschr.," 1910-1911, lv., p. (28).)

Hastula hyerana, Mill. Pupa with 4th and 5th abdominal segments fused. (Chapman, quoted by Christeller, "Ent. Mitt.," 1917, vi., p. 16.)

In Hein's experiments with *Tenebrio molitor*, segmental defects did not appear to be hereditary. In *Drosophila*, on the contrary, one segmental defect behaved as a sex-linked dominant, but only appeared if the environment of the larvæ and pupæ was moist. Bred in a dry environment all appeared normal, but the next generation bred in a moist atmosphere showed the abnormality again.

ABNORMAL TUBERCLES.

Dr. Chapman and Mr. Bacot on several occasions have met with larvæ with an abnormal arrangement of tubercles on one side of a segment, chiefly in *Aretianae*. I can find only two recorded examples of this kind of defect.

Larvæ of *Orygia antiqua*, L. On the second segment on the left side the tuft of black hairs was half the length of that on the right, but there was a short extra tuft not present on the right side at all. (Bird, "Ent. Record," 1905, xvii., pp. 311-315.)

Hybrid larva, *Philosamia ricini* × *P. cynthia*, with no infrspiracular tubercle on the left side of the segment. (Hawkes, "Journ. of Genetics," 1918, vii., pp. 135-154.)

I have a preserved larva of *Asphalia flavicornis* in its last instar, taken near Sheffield in July, 1902, with a unilateral defect. On the left side of the ninth segment the black subdorsal spot is absent, and the associated oval white spots, with their central tubercle, except the one anterior to the black spot, are missing. The spiracle on the left side is normal, but the crescentic black spot above it is reduced to a circular dot, and the hair above is thinner and shorter than usual. There is no scarring, and the right side of the segment is normal.

These unilateral defects are probably developmental, but like the defects of segmentation, not hereditary. Defects in the midline are—

Larva of *Triana psi*, L., with unusual development of fleshy horn (Moore, "Ent. Record," 1908, xx., p. 248).

Larva of *Sphinx ligustri*, L., with a small chitinous plate replacing the horn (Schultz., "M. Wochenschr. f. Ent.," 1898, iii., p. 859).

Pupa of *Celerio euphorbiae*, L., with cremaster like a modified larval horn (Rangnow, "Intern. Ent. Zeitsch, iv., 50, p. 276)."

HEREDITARY ABNORMALITIES OF TUBERCLES.

Amongst hybrid larvæ of *Philosamia ricini*, Boisds., male, \times *P. cynthia*, Drury, female, some had no tubercles, and others had reduced tubercles.

F. 2 larvæ, with reduced tubercles, behaved as mendelian recessives. (Hawkes, "Journ. of Genetics," 1918, vii., pp. 135-154, fig.)

Bombyx mori, L. A number of larvæ were bred which had no caudal horn. Mendelian inheritance was not proved. (Kellogg, "Inheritance in Silkworms," i., Stanford University, 1908.)

Smerinthus ocellatus, L. Broods of larvæ without caudal horns are reported by Kuhlmann and Kreeker. In the latter case they were noticed to be hornless on emerging from the egg. ("Ent. Zeitschr. Guben," 1900, xiii., p. 144 and 154.)

Bombyx mori, L. Larvæ with knobs which were paired evaginations of skin in the subdorsal line. These first appeared after the third ecdysis, were fully developed in the last instar, but were still visible in the pupa and imago. Mendelian segregation occurred. (Tanaka, "Genetic Studies in the Silkworm, Journ. Coll. Agricult., Tohoku Imperial Univ. Sapporo," June, 1916.)

ABNORMAL NEURATION.

Abnormal neuration is common in the case of extra wings, and an example of an extra nervure has been mentioned in connection with homoeosis. It is also met with as an independent abnormality. Morgan found that cases of symmetrical defect or excess of neuration in the fruit fly were hereditary, and this may be the case in Lepidoptera also. I know of no experimental evidence on this point.

SYMMETRICAL EXCESS.

Papilio merope, Crani., with additional cell symmetrically placed in both forewings. (Trimen., "Proc. Ent. Soc. Lond.," 1873, 21, p. ii.)

Parnassius clodius, Ménétries. Similar specimen. (Murray, *ibid*, 1872, 83, p. iv.)

SYMMETRICAL DEFICIENCY.

Papilio machaon, L., with the second discoidal nervure in both fore- and hindwings missing, causing the absence of one submarginal lunule in all the wings. ("Proc. South Lond. Ent. Soc.," 1895, p. 47.)

Pararge megera, L., male. Second nervure of median vein is wanting in all four wings. In forewings, where vein should cross, is an extra ocellus. In hindwings the two ocelli, which should be separated by the vein, are fused and elongated towards one another. (Webb, "Ent.," 1889, xxii., p. 289, fig.) Also figured by Bateson. ("Materials for the Study of Variation," p. 301.)

Melitaea aurinia, Rott. Six nervures almost symmetrically deficient on either side, causing alteration of submarginal black lunules. Janson, Kent. ("Proc. Ent. Soc. Lond.," 1914, p. lxxx.)

Saturnia pavonia, L. Ocellus in both forewings replaced by yellow dash, and at least one nervure deficient. Bred by Barlow. ("Proc. Ent. Soc. Lond.," 1851, i., p. 100.) The male figured by Bateson bred from a larva found on willow, in Sawston Fen, Cambridgeshire, and by Bond ("Ent.," 1877, p. 1) is probably the same specimen. It is mentioned in Humphrey's "Brit. Moths," p. 20. In other eyeless *Saturnias* the neurulation is not mentioned.

Melitaea aurinia, Rott. A nervure missing in each hindwing, probably the seventh, or possibly the sixth. (Bright Coll.)

Eucosmia immundana, Fab., with veins seven and eight stalked in both forewings in two specimens, in one forewing in one.

E. tetraquetra, Haw., and *E. crenana*, Hubn., single specimens of each with the same altered neurulation in both forewings. (Durrant, "Ent. Month. Mag.," 1910, xlv., p. 85.)

Dicranura felina, Butl. Veins three and four becoming coincident in the forewing on each side. Almost symmetrical. The markings are altered by the union of nervures, (N. H. Museum.)

Batesia hypoxantha, G. and S. Subcostal nervure of hindwing united by a short bar to upper discoidal nervure. Position of bar different on the two sides. (Lathy, "Proc. Ent. Soc. Lond.," 1904, p. 67.)

ASYMMETRICAL NEURULATION.

Papilio thoas, L. Left hindwing with abnormal neurulation. Subcostal nervure bifurcated a little beyond cell, sending extra branch to posterior margin. Seven instead of six ochreous spots in discal band and an extra submarginal lunule. Right hindwing normal. ("Proc. Ent. Soc. Lond.," 1890, p. ii.)

Papilio americanus, Koll. (*sadulus*, Lucas). Radial nervures absent in right hindwing; precostal nervures dissimilar and abnormal. Submarginal spots abnormal. Tail much shorter than in the other wing. ("Proc. Ent. Soc. Lond.," 1881, p. xxviii.)

Pyrameis cardui, L. Small left hindwing with abnormal neurulation. Nervures three, five and six do not reach the margin; four branches twice and thus reaches the margin at three points. Two pairs of spots coalesce. (C. Nicholson, "Ent. Record," 1893, iv., p. 189.)

Zemeros flegyas, Cram. Nervure eleven branching out of twelve in forewing. (Brit. Mus. Coll.)

Pyropsyche moncaunella, Chapman. Missing nervure partially represented in two specimens. (Chapman, "Proc. Ent. Soc. Lond.," 1904, p. 99.)

Parnassius apollo, L. (Bryk., "Parnassius Apollo," Berlin, 1915, p. 104.)

NON-UNION OF PAIRED MEDIAN STRUCTURES.

Pupa of *Sphinx ligustri*, L., with tongue sheath bifurcate. (Bond, "Proc. Ent. Soc. Lond.," 1852-1853, ii., p. 4.)

Pupa of *Sphinx ligustri*, with double proboscis; the two mandibles had not united to form a single proboscis, but were divaricated. (Kraatz, "Deutsch. Ent. Zeitschr.," 1880, xxiv., p. 345, fig.)

Pupa of *Sphinx ligustri*, with double proboscis sheath and other defects. (Fromholz, "Berl. Ent. Zeitschr.," 1888, xxxii., p. 229, fig.)

Pupa of *Sphinx (Hyloicus) pinastri*, L., with double proboscis sheath, each half bowed outwards, forming a ring (H. Gauckler, "Ill. Wochenschr. f. Ent.," 1896, i., p. 563, fig.)

Pupa of *Smerinthus ocellatus*, L., with double proboscis sheath, the two halves slightly divergent. No other abnormality. (Christeller, "Ent. Mitt.," 1917, vi., p. 99, fig.)

Imago of *Vanessa io*, L., with double proboscis. From time to time it tried to use both, and one or other unrolled. Apparently each could be moved independently. (Maréchal, "Rev. Ent. Soc. Namuroise," 1902, p. 49.)

ARREST OF DEVELOPMENT.

Manduca atropos, L. Imago with abnormally long proboscis. Chapman explains this as due to an arrest of development. The proboscis in this species is long at first and then shrinks during the later part of the pupal period. The shrinkage has not occurred in this specimen. ("Ent. Rec.," 1902, xiv., p. 129.)

Plebeius argus, L. (*aegon*, Schiff.). Male with tarsus divided into three joints instead of having all the joints and claws fused without trace of articulation. (Chapman, Spain, "Proc. Ent. Soc. Lond.," 1909, p. xv.)

Flint reports that in a brood of larvæ of *Endromis versicolor*, L., which died without eating, the mesenteron and gnostodeum had failed to join, so that there was no continuous lumen to the gut. ("Entomologist," 1901, p. 363.)

DUPLICATION OF PARTS.

Bateson finds that in insects extra appendages, with the exception of wings, are arranged in the following way. They may arise from the body near the part repeated, but much more frequently they occur as outgrowths from an appendage. The parts found in an extra appendage are those parts which in a normal appendage lie peripheral to the point from which the extra appendage takes its origin. Extra appendages are double, or when single show that they are fused double appendages. The long axes of the double appendage, and of the two extra appendages, are in one plane. One of the two extra appendages is nearer to the axis of the normal appendage, and the other more remote from it. The nearer of the two is in structure and position formed as the image of the normal appendage, in a plane mirror placed between the normal appendage and the nearer one, at right angles to the three axes. The remoter appendage is the image of the nearer in a plane mirror similarly placed between the two extra appendages. The nearer of the two is thus structurally an appendage of the opposite side of the body.

The cause of extra appendages of this nature appears to be a slight injury. Tornier has shown that a cut into the posterior limb bud of a frog causes the outgrowth of a pair of extra limbs arranged in this way. ("Arch. f. Entw'm.," 1905, xx., p. 76, and "Sitzungsber. d. Ges. Naturf. Berlin," 1907, p. 41.) Chapman bred an *Ocneria dispar*, L., with two tibiae after crushing the larval leg. ("Ent.," 1901, xxxiv., p. 30.) This extra tibia was presumably a fused double extra tibia, one half being a mirror image of the other, such as is obtained by half immersing a tibia in mercury.

In this connection one must mention the race of *Drosophila ampelophila* with supernumerary legs. Sometimes several legs or parts of a leg are doubled, and the doubling is of the character described above. Bred in a temperature of 10°C., Miss Hoge found that the inheritance was Mendelian, but at normal temperatures few flies showed the abnormality. This can be explained by supposing that the limb buds of this race are peculiarly liable to injury by cold. ("The Mechanism of Mendelian Inheritance," Morgan, Sturtevant, Muller and Bridges, pp. 41 and 42.)

ARSENCE OR REDUCED SIZE OF PARTS.

Newport has shown that clean amputation of a part during the developmental period may lead to its complete absence or regeneration of the part may take place, but though perfect, the regenerated part is smaller than the normal. ("Proc. Ent. Soc. Lond.," 1845-47, iv., p. 97.)

De Kerville has amplified Newport's work. By injuring the legs and antennae in a number of species of Lepidoptera, he has obtained partial or complete regeneration with normal or abnormal form, but with reduction of size. He figures the leg of *Papilio podalirius*, L., small and incomplete, regenerated after injury to the larva during the fourth or fifth instar. He has obtained similar results in the case of wings, and figures a *Pieris brassicae*, L., with a very small left forewing, caused by injury to the median part of the thorax of the pupa, and an *Yponomeuta malinella*, Z., with extremely small wings on the right side, produced by lightly cutting the wings at the base in the pupal stage, six days before emergence. ("Experiences teratogéniques sur différentes espèces d'insectes," Henri Gadeau de Kerville, "Le Naturaliste," 1890, p. 114). Little is known of the kind of injury which operates in nature. There is a record of an *Acronicta psi*, L., from the larva of which two small larvae of an ichneumon emerged, and which produced an imago with one hindwing missing. ("Ent. Month. Mag.," 1864-65, i., p. 118.) Harding states that he has met with dwarfing or absence of wings on one side in *Melitaea aurinia*, Rott., *M. cinxia*, L., and *Aglais urticae*, L., after parasitism by a few larvae of *Microgaster*, instead of the usual large number. He also refers to a moth with one hindwing missing, bred from a larva which had had an injury to the legs. This was reported in the "Field." ("Ent.," 1888, xvi., p. 257.)

DUPLICATION.—LEG.

Zygaena anthyllidis, B. This specimen has three tarsi on the meta-

thoracic leg on the left side. There is an extra pair arranged in secondary symmetry. (N. H. Museum Coll.) Chapman gives description and figure. ("Proc. Ent. Soc. Lond.," 1914, p. lxxxiv., and "Ent. Record," 1915, xxvii., p. 98.)

Cosmotriche potatoria, L., male, with double tarsus on left foreleg. The tarsi were smaller with fewer scales than normally, but had perfect claws. ("Ent. Mo. Mag.," 1899, xxxv., p. 270.)

Catocala nupta, L., with double tarsus on left foreleg. No evidence that either is a fused double structure. Figure and description. ("Trans. Ent. Soc. Lond.," 1907, p. 173.)

Parnassius apollo, L. Two tarsi on left foreleg, both a little shorter than a normal tarsus. (Bleuse, "Bull. de la Soc. Ent. de France," 1900, p. 52.)

Plusia iota, L., male, with extra leg between left anterior and middle legs. In form like a front leg, but with tibia a little longer and tarsus a little shorter. England. (Ibid.)

Smerinthus ocellatus, L., with complete additional hindleg on left side. The left leg was ankylosed and useless. It had a femur longer than usual, a tibia, and five-jointed tarsus. The pupa had a bulge on the ventral surface. ("Illust. Wochenschr. f. Ent.," 1897, ii., p. 632.)

Oeneria dispar, L., male, very small incomplete extra tarsus on hindleg. ("The Gypsy Moth, Report of Massachusetts Board of Agriculture, 1896.," Forbush and Fernald, pl. li., fig. 8, p. 341.)

Cosmotriche potatoria, L. In the Tring Museum is a preserved larva with an extra pair of claspers, which lie above the second clasper on the left side. They appear to be in secondary symmetry. The specimen is labelled Hanwell, Middlesex, 1892.

Duplication of legs is quite common in Coleoptera, but it is probably overlooked in Lepidoptera.

DUPLICATION.—ANTENNÆ.

Zygaena. Several records of specimens with three antennæ. (Illustr. Wochenschr. f. Ent.," 1897, ii., p. 632.)

Zygaena lonicerae, Esp., with four antennæ. Bred Flamborough. (C. Couldwell Hall, "The Naturalist," 1919, xlv., p. 182.)

Z. filipendulae, L. The right antenna separated near the base into two well built antennæ. The left was split near the middle into two for a length of about 3 or 4 mm. and was joined together again at the tip. Both appear to have been partially fused double antennæ. Bred from pupa. Korn. Danzig. ("Ent. Zeitschr. Guben," 1892, V., p. 152.)

Leucania pallens, L., with two well developed antennæ on one side and one of double the normal thickness with a bifid extremity on the other. ("Ent. Record," 1914, xxvi., p. 127.)

Doleschallia amboinensis, Stgr., female, with two antennæ on the right side superposed, the lower one a little the shorter. (Oberthür, "Bull. de la Soc. Ent. de France," 1900, p. 53.)

Crambus alpinellus, Hb., with three antennæ. Staudinger Coll.

("Illustr. Wochenschr. f. Ent.," 1897, ii., p. 632.) (Giard, "Bull. Soc. Ent. France," 1900, p. 53.)

Olene leucophaea, Abbot and Smith. Male, with two antennæ on each side. In the figure the extra antennæ are depicted as arising from a different point from the normal ones, and show no evidence of being double structures. (E. J. Smith Coll., "Psyche," 1904, ii., p. 118, pl. x.)

Conistra (Cerastis) liqua, Esp. Specimen in N. H. Mus. labelled Hayward, Repton, 8.10.06. There are two antennæ on the left side, arising from distinct but contiguous bases. They are about two-thirds the normal length. The anterior one is thinner and takes origin from a point above and in front of the normal position. The surfaces covered by pale scales are turned slightly towards one another, but one does not appear to be the mirror image of the other. There is no evidence of double structure in either, but the antennæ in this species show no decided structural difference in the characters of the anterior and posterior surfaces. So that the microscopical examination does not prove that one is not a fused double antenna, consisting of two anterior halves or two posterior halves. The dorsal and ventral surfaces are normal in both. ("Ent.," 1906, xxxix., p. 294.)

Coscinocera hercules, Misk., male. Saturniid moth. On the left side one antenna, on the right two, the first in the normal position a little shorter than the left, the second slightly behind, well developed, but also a little shorter than the normal. Both are fully pectinated. The head appears enlarged on the right side. Captured by Dodd, Queensland. (Oberthür, "Bull. Soc. Ent.," 1912, p. 369.)

Saturnia pavonia, L., male. A small third antenna arises, not from the root of the other but quite 2mm. away and above, directly from the face. Bred from a Dalmatian larva. (Windhorst, "Ent. Zeitschr. Frankfurt," 1914-1915, xxviii., p. 3, fig.) This is remarkable in that the normal antenna is not reduced in size. There can be no doubt that this is a genuine example of an independent extra appendage.

DUPLICATION.—PALPI.

Euprepia purpurea, L., with three palpi, not with an extra pair of palpi as Bateson suggests. Gynandromorph, right side male, left side female. (Freyer, "Beiträge. z. Schmetterlingskunde," 1845, v., p. 127, Taf. 458, fig. 4.)

DUPLICATION OF WINGS.

In the few cases studied by Bateson there was no example conforming to the rule that extra parts are double and in secondary symmetry. With a large series of records three main groups can be separated.

(1) Repetition of a wing or part of a wing, the extra wing being in structure a wing of the same side as the normal wing. Examples of this kind may be regarded as simple meristic repetitions.

They may be either fore- or hindwings, and may be in front of, behind, above, or below the normal wing. Both wings may be perfect

and of full size, but more often they are small and imperfect, especially the extra wing.

(2) Repetition of a wing or part of a wing, which in structure belongs to the opposite side of the body to the normal wing. In other words, the extra wing is a mirror image of the normal wing. There are four possible positions for such an extra wing; in front with its costa opposed to the costa of the normal wing, behind with its hind margin opposed to the hind margin of the normal wing, above with its upper surface facing ventrally, opposed to the upper surface of the normal wing, or below with its under surface facing dorsally, opposed to the under surface of the normal wing. In the first position the costa of the extra wing may be united to the costa of the normal wing, or the two wings may be quite separate. The second position seems to be rarer, and in the only example I know the two wings are separate.

(3) Two extra wings or parts of wings in secondary symmetry. In some of the recorded examples the description is too meagre to allow of classification, in others the extra wing is too rudimentary, or the neuration too abnormal to determine whether it falls into any of these groups.

GROUP I.—MERISTIC REPETITION.

Samia cecropia, L., male. Repetition of anterior part of left forewing. (Strecker, "Entomologica Americana," 1885, i., p. 56. "Proc. Acad. Nat. Sc. Phila.," 1885, p. 26. Bateson, "Materials for the Study of Variation," p. 288.)

Samia cecropia, female. Small right forewing in front of normal forewing, complete but somewhat crumpled posteriorly. (Sampson, "Psyche," 1904, ii., p. 113, fig., pl. x.)

Nania typica, L. Two left forewings one behind the other, both well developed, but smaller than usual, and apparently with normal neuration. (Wiskott, "Iris," 1897, p. 391, pl. xii.)

Aglais urticae, L. Hindwing furnished with an additional perfect wing of very small size. ("Proc. Ent. Soc. Lond.," 1845-47, iv., p. 5.) This is probably the specimen figured by Westwood, from the Stephens collection, taken by Doubleday at Epping. ("Trans. Ent. Soc. Lond.," 1879, p. 219, pl. vi.)

Gonepteryx rhamni, L. Two hindwings one above the other; the neuration in each deficient, the anterior part of the neuration normal in one, the posterior part in the other; the neuration of the two together is in excess of that of a single wing. New Barnet. (Westwood, "Trans. Ent. Soc. Lond.," 1879, p. 219, pl. vi.)

Limenitis populi ab. *tremulae*, Esp. There is an extra lobe attached to the posterior margin of the left hindwing; the extra lobe has the neuration of the anterior part of a normal wing. (Wiskott, "Iris," 1897, p. 391, pl. xii. Röber, "Iris," 1884, i., p. 81.)

Pieris brassicae, L. Small additional right forewing lying behind the reduced normal wing. (fig., Guackler, "Illustr. Wehnschr. f. Ent.," 1897, ii., pp. 374-6.)

Brephos parthenias, L. Small additional left hindwing behind the normal one. (Ibid.)

Poecilocampa populi, L., female. Left hindwing slightly crippled. Rudimentary extra wing anterior to right forewing. ("Proc. South Lond. Ent. and N. H. Soc.," 1904, p. 88.)

Zygaena exulans, Hoch., with six wings. Rudimentary fore- and hindwings arise between the left forewing and the corresponding leg. They are both left sided in structure. (Brit. Mus. Coll. Chapman, "Ent.," 1898, xxxi., p. 72. "Ent. Record," 1898, x., p. 107; 1915, xxvii., p. 93.)

Agriades coridon, Pod., female. A small extra hindwing with dark fringe, lying above the middle of the normal hindwing. (Mason Coll. "Nat. Journ.," 1896, v., pl. iv., fig. 10. Tutt, "Brit. Ent.," vol. iv., p. 7.)

Saturnia pavonia, L., female. Two small hindwings on left, both with perfect neuration. The second arises on a level with and immediately behind the first. Bateson gives a full description. (Mason Coll. "Proc. Ent. Soc. Lond.," 1888, p. xv.)

Macrothylacia rubi, L., female. Additional hindwing on left side arising immediately above normal wing. It was of normal length but only 6mm. wide. (Speyer, "Stett. Ent. Zeitung," 1888, xlix., p. 206.)

Liparis auriflva, Fab., female. Loughton, 1915. A. W. Mera. Extra forewing lying above posterior part of the left forewing. The wing is 10mm. long, narrow and crumpled. The neuration is obscured. The normal forewing is 20mm. long, but is narrower than the right forewing, and a little curled along the posterior border.

Diloba coerulescephala, L. There is a small extra left hindwing arising below and in front of the normal hindwing. It is very narrow and very short, with defective and abnormal neuration. The normal hindwing is narrower than the opposite one. Structurally it appears to be a left wing. R. Freer, Rugeley, 1896. N. H. Mus.

The following specimens from the Joicey Collection were shown at the Entomological Society, March, 1921, by Mr. Talbot.

Colias eurytheme, Boisd., male, Texas. An extra right hindwing, the same way up as the normal wing and lying above it. The extra wing is small and curled up, the normal wing is small.

Cosmotriche potatoaria, L., female. An extra right hindwing, very small but normal in shape, lies above the normal hindwing, which is pale and reduced in size.

Eudia (Saturnia) pavonia, L., female. Germany. An extra left hindwing lies above and in front of the normal one. The normal wing is very small, but is of good colour, and the neuration seems to be unaltered. The extra wing is small but longer than the normal, and pale in colour, due to deficiency of scales. The pattern is a little abnormal, the inner line being bent too sharply inwards behind the ocellus, resembling that of the forewing. The neuration appears to be normal.

Zygaena filipendulae, L., bred, Tatchell, S. Hants, 1918. Extra left hindwing above and behind the normal. Both are reduced in size and the extra wing is very thinly scaled.

All four examples have the extra wing the same way up as the normal one.

GROUP II.—MIRROR IMAGES

(a) *Costa to Costa*

Lasiocampa quercus, L., male. Two right forewings united costa to costa. (Figured by Gauckler, "Illustr. Wochenschr. f. Ent.," 1897, ii., pp. 374-6.)

Crateronyx dumi, L. Two right forewings united costa to costa. (Figured by Wiskott, "Iris," 1897, p. 391, pl. xii.)

Crocallis elinguaris, L. Two left forewings, the costa of the foremost facing that of the normal. (Figured by Wiskott. Ibid.)

Abraxas grossulariata, L. Left forewing with lobe on costa, with mirror image of pattern of neighbouring part of normal forewing. (Figured, "Ent.," 1893, xxvi., p. 145.)

Agriades coridon, Poda, male. Two hindwings united costa to costa; spots all present, but small. (Tutt, "Brit. Butt.," iv., p. 7.)

(b) *Posterior Margin to Posterior Margin.*

Epiblema ustulana, Hübn. Left side normal. Right side normal forewing. No hindwing, but there is a reversed forewing, occupying the position of a hindwing, except that it arises more anteriorly. The colour and pattern, and the structure, are those of a forewing of the opposite side. (Figured, "Societas Entomologica, Zürich," 1909-1910, xxiv., pp. 56, 60.)

(c) *Extra wing above normal wing: upper surfaces face to face.*

Apatura iris, L. Small left hindwing lying face downwards above normal wing. (Figured by Wiskott, "Iris," 1897, p. 391, pl. xii.)

(d) *Extra wing below normal wing: under sides face to face.*

Samia cecropia, L., female. Extra hindwing on left side. "Ent. News. Phila.," 1913, xxiv., p. 337, pl. xi.)

Lasiocampa quercus, L., female. Extra left forewing. ("Berl. Ent. Zeitschr.," 1888, p. 495, pl. vii.)

GROUP III.

Calcosia renosa, Walk., female. E. E. Green, Ceylon. Three forewings on left side, the first and third half the normal size, the second very small and contorted. The specimen is in the Natural History Museum. It is impossible to determine the true relationship of these wings to one another, but it appears probable that two of them are extra wings in secondary symmetry. ("Ent. Month. Mag.," 1900, xxxvi., p. 197. "Proc. Ent. Soc. Lond.," 1900, p. v. Fuller description, Tutt, "Ent. Record," 1899, xi., p. 203.)

Ematurga atomaria, L. Two extra wings with left hindwing. Rudimentary: perfect fringes. C. P. Pickett, Folkestone. ("Ent.," 1906, xxxix., p. 261. "Proc. Ent. Soc. Lond.," 1906, p. lxvii.)

Male. Central wing half the normal size, the other two rudimentary, one with normal colour and pattern, one plain grey. Captured

April 6th, 1906, Folkestone. (Pickett, "Ent. Rec.," 1906, xviii., p. 190.)

Dasychira pudibunda, L., with three right hindwings. (Honrath, "Berl. Ent. Zeitschr.," 1891, xxxvi., p. iv.)

Arctia caia, L. Three left hindwings, one above the other, close together; well formed. Bred by Hugh Main, 1904. ("Proc. Ent. Soc. Lond.," 1904, p. lv.) This specimen is in the Nat. Hist. Mus.

The costal border of the left hindwing, from base to apex, is single; it divides at the same point into three, each fully scaled on both surfaces, and with perfect fringes.

The upper layer is rather smaller than normal, and its under surface is paler than its upper. The second layer is a good deal smaller, and its upper surface appears paler than its under surface. I think it may be regarded as a mirror image of the upper layer. The third layer is larger than the second, but smaller than the upper or first. Its upper surface is darker than its under surface. It is thus a mirror image of the second. The two lower layers may be regarded as extra parts of a wing in secondary symmetry.

UNCLASSIFIED.

Polyommatus icarus, Rott., male. The left forewing is bilobed, the anterior lobe is in shape and neuration like the anterior part of a normal forewing, but the anterior part of the posterior lobe is quite abnormal in neuration, and does not correspond to any part of a normal fore- or hindwing. The posterior part of the posterior lobe has the neuration of the posterior part of a normal forewing. ("Berl. Ent. Zeitschr.," 1888, p. 495, coloured fig., pl. vii.)

Amorpha populi, L., male. Captured. There is a long appendage at the base of the right hindwing, very rudimentary in structure, but scaled. ("Proc. South Lond. Ent. and N. H. Soc.," 1904, p. 88.)

Janthinea frivaldskyi, Dup. Narrow extra right forewing, anterior part only, lying beneath normal wing. It appears to have underside uppermost, and in that case belongs to Group II. (Wiskott, "Iris," 1897, p. 391, pl. xii.)

Dasychira pudibunda, L. Extra right hindwing. Probably Group II. (Ibid.)

Anthrocera filipendulae, L. Five wings. ("Ent.," 1910, xliii., p. 44.)

Anchochelis lunosa, Haw., male. Right forewing much broader and differently formed. This is probably a double wing. ("Proc. Ent. Soc. Lond.," 1871, p. xli.)

Gonepteryx rhamni, L. Five wings. J. Woodgate, Brandon, 1878. ("Ent. Mag.," 1878, xiv., p. 189. "Proc. Ent. Soc. Lond.," 1877, p. xxvi.)

Orthosia lavis, Hübn. Additional hindwing on left. Pesth. Mus. (Treitschke, Bd. vi. Abth., ii., p. 407. "Illustr. Wchenschr. f. Ent.," 1897, ii., p. 681.)

Pygaera anastomosis, L. Wing-like appendage to left forewing. Oechsenheimer Coll. ("Illustr. Wchenschr. f. Ent.," 1897, ii., p. 681.)

Nania typica, L. Additional hindwing. Neustadt Coll., Breslau. (Ibid.)

Zygana minos, Schiff. Additional forewing left side inserted above and between the normal wings. The shape is that of a hindwing, the colouring that of a forewing. Neuration peculiar. A figure and a diagram of neuration are given. (Rogenhöfer, "Verhandl der Zool.-bot. Ges. in Wien.," 1882, xxxii., p. 34.)

Phalana sp. Five wings. Borekhausen. ("Proc. Ent. Soc. Lond.," 1886, i., p. lxxiv.)

Brephidium exilis, Boisd. Pearson, Pasadena. Right forewing duplicated. ("Ent. Record," 1921, xxxiii., p. 199.)

Arctia caia, L. It is stated that there is a figure of a specimen with five wings in Mosley's "Illustrations of Varieties of British Lepidoptera." I have been unable to find it. ("Ent. Record," 1909, xxi., p. 75.)

Heliothis incarnata, Frr. Above the right forewing is a narrow, folded, crumpled wing, with fringe plainly visible. (Rangnow, "Berlin Ent. Zeitschr.," 1913, lviii., p. (13).)

Ellopiia prosapiaria, L. Extra forewing in front of normal forewing on left side. Neuration of both normal, except that a subcostal nervure is absent in the normal. Both are small. The extra wing is twisted, but looks like a wing of the opposite side. (Christeller, "Ent. Mitt.," 1917, vi., p. 123.)

Limnas chrysippus, L., female. Small hindwing lying above the normal hindwing on the left side. Markings absent. (Byatt and Poulton, "Trans. Ent. Soc. Lond.," 1905, p. 263, pl.)

Luperina testacea, Hubn. Five wings. J. A. Clark Coll.

The following are generally included in lists of extra wings, but from their pattern and neuration they appear to be bilobed single wings.

Penthina salicella. Left forewing one quarter wider than right, apical border markedly emarginated. Nervures normal, but cells between subcostal nervures wider than normal. (Rogenhöfer, "Verhandl. der Zool.-bot. Ges. in Wien.," 1882, p. 34.)

Eupithecia castigata, Haw. Deep cleft in left forewing, which is wider than normal. (Wiskott, "Iris," 1897, p. 391, pl. xii.)

Parnassius discobolus, Stgr., male. Deep indentation with what appears to be an extra nervure right forewing. ("Illust. Wochenschr f. Ent.," 1897, ii., p. 374.)

Excluding the cases discussed under Homoeosis, Tannreuther's is the only example of bilateral extra wings. They were discovered in sections through a larva of *Pieris rapae*, L., killed thirty hours before pupation. They lay in the mesothorax and were similar in outline to normal wings, but had no nervures, and only a few minute tracheoles between the two single layers of hypodermal cells. The sections gave no clue to their origin. Figures of the microscopical and general appearance are given. ("Zool. Anz.," 1901, xxiv., p. 620.)

From my list it will be seen that the commonest form of extra wing is that which occurs as a meristic repetition. An extra wing, which is

complementary, forming a mirror image of the normal is much rarer. The rarest form is that in which two extra wings are present in secondary symmetry. This condition is almost certainly the result of injury.

Extra wings seem to be equally rare in all families. In species in which two examples are known one may be an example of meristic repetition, and the other may be complementary, as in *Samia cecropia*, *Agriades coridon*, and *Lasiocampa quercus*. In this respect extra wing formation differs greatly from homoeotic repetition of wing pattern.

DUPLICATION OF THORACIC PATTERN.

Manduca atropos, L., male, with two death's heads on thorax. (Swoboda, "Intern. Ent. Zeitschr.," 1909, iii., p. 2.) This doubling of such a distinct thoracic pattern indicates some developmental defect of the underlying chitinous structure of the thorax.

FUSION OF WINGS.

I know only one example of union of a fore- and hindwing. It appears probable that this is due to injury.

Aspilates citraria, Hubn. The two wings on one side united together and not larger than the ordinary size of one of the posterior wings. Westwood, I. of Wight. ("Proc. Ent. Soc. Lond.," 1836, i., p. lxxiv.)

Fusion of any of the appendages in any order is very rare. An example of fusion of two legs in a louse, *Pediculus humanus*, is figured by Keilin and Nuttall. ("Parasitology," 1919, xi., pp. 279-328.)

DEVELOPMENTAL ANOMALIES PROBABLY NOT DUE TO INJURY.

Brenthis euphrosyne, L. Melanic aberration with spatulate part of antennæ nearly double the usual length. ("Proc. Ent. Soc. Lond., 1857, p. 27.)

Parnassius apollo, L., with clubs of antennæ unusually long, and ending in a pointed process. Symmetrical. (Bryk, "Parnassius apollo," Berlin, 1915. Taf. xxxii.)

Melitaea matura, L. Clubs of antennæ scarcely $\frac{1}{2}$ cm. long. ("Ill. Wochenschr. f. Ent.," 1900, v., p. 99.)

Melitaea aurinia, Rott. Antennæ scarcely more than half the usual length. "Ent.," 1872-73, p. 53.)

Ocneria dispar, L. Two correspondents bred large numbers, in which the wings of the males were normal, but many of the females were nearly apterous. ("Ent.," 1888, pp. 235, 322.) This is of interest in view of the apterous condition of the females in many species of the allied genus *Orgyia*, and still more so when one calls to mind *Orgyia thalina*, Butt., a Japanese species with two forms of female, one fully winged and one subapterous. ("Proc. Ent. Soc. Lond.," 1889, p. viii.) A similar state of affairs exists in *Acentropus niveus*, Oliv., which has females fully winged or with mere rudiments, but no intermediates. Newstead found an almost wingless female of *Himera pennaria*, L., paired with a normal male. From its eggs four imagines were bred, the two females showing to some extent the characteristics

of the female parent, the two males being normal. ("Proc. Lanc. and Chesh. Ent. Soc.," 1918, 1919, 1920, xliv., pp. 19, 20.) This species is one in which the female makes little use of its wings.

It is quite likely that in species with winged and almost wingless females, and without intermediates, the almost wingless form arose as a mutation. This view is upheld by Brues, who bases his argument on the condition found in Coleoptera. ("New York Journ. Ent. Soc.," 1908, xvi., pp. 681-693.) And if so, the sudden appearance of a number of almost wingless females in the brood in a genus like *Oenieria* is probably due to a mutation. In *Bombyx mori*, on the contrary, where all grades of defect of the wings occur, Darwin's view that the change has been gradual may be the true one. According to Quatrefages these moths may have their wings reduced to a third, fourth, or tenth part of their normal dimensions, or even to mere short straight stumps in the females. ("Animals and Plants under Domestication," vol. i., p. 820.)

The following are examples of a mutation of considerable rarity, characterised by abnormally short broad wings.

Pterostoma palpina, L., var. *brevipennis*, Chapman. All four wings abnormally short and broad. Several appeared in one brood. (Proc. Ent. Soc. Lond., 1910, p. lx.)

Naenia typica, L. All four wings very short and very broad. A third of a large brood were in this condition. (Porritt, "Proc. Ent. Soc. Lond.," 1895, p. xlii. Barrett, "Brit. Lepidopt.," pl. 217, fig. 1. d.) Porritt states that similar aberrations of *Agrotis tritici*, L., and *Hadena chenopodii*, Fab., are known.

Melitaea aurelia, Nick., *Cidaria fluctuata*, L., and *Zygana pilosellæ*, Esp., with the same strangely shaped wings are figured by Wiskott. ("Iris.," 1897, Taf. xii., p. 391.)

Macrothylacia rubi, L., male, with short, broad, rounded wings. The transverse lines almost touch one another. Captured by Dr. Nash, Barton, Bedford, 1918.

Zygana trifolii, Esp., male. An extreme example of this mutation was shown at the Entomological Society of London, October, 1921, and was caught in Sussex by T. H. L. Grosvenor.

Cabera (Deileinea) pusaria, L., var. *rotundaria*, Haw., probably belongs to this group.

The rarity of the mutation and its occurrence in a proportion of one to three normals, in Mr. Porritt's brood of *N. typica*, L., suggests that it is a Mendelian recessive.

The following examples of symmetrical alteration in the shape of the wings may be mutations, but there is no evidence to prove this.

Agriades coridon, Poda., male, with broad round wings. Alton Barnes. Rev. C. A. Sladen's Collection.

Callimorpha dominula, L., with rounded wings. ("Proc. South Lond. N. H. Soc.," 1911, p. 81.)

Pyrameis atalanta, L., with very broad wings. (Ibid, 1899, p. 108.)

Zygana lonicerae, Esp., with forewings abnormally broad or narrow. (Hewitt, "York. Ent. Record," 1890-91, i., pp. 59, 60.)

Hemaris fuciformis, L. A very small specimen with very broad border, almost reaching the disc, and with very narrow wings, was bred by Mr. Burnett from a Horsley larva, and shown at the South London N. H. Society, November 25th, 1920.

Colias edusa, L., with narrow forewings. (Cockerell, "Ent.," 1889, xxii., p. 147.)

Melanippe fluctuata, L., with long narrow wings like a *Eupithecia*. ("Ent. Record," 1905, xvii., pp. 311-315.)

Laertias philenor, L. A number bred together with the tails considerably aborted. ("Ent. News. Phila.," 1908, xix., p. 85.)

The specimen of *Wheeleria spilodactyla*, Curt., with no cleft instead of one cleft in the forewings, and one cleft instead of two in the hindwings, is almost certainly a mutant. ("Ent. Record," 1912, xxiv., p. 50.)

A series of remarkable aberrations of *Thais rumina*, L., most of which come from Algeria, is known. They affect the semicircular indentations of the wing membrane between the nervures. The indentation between one or more nervures appears as if cut straight, and the usual concave black marking is correspondingly straightened. The abnormality is bilaterally symmetrical. A series of these is figured by Oberthür under the title "Deformation de la dentelure des ailes." ("Études," 1915, x., pl. cclxxvii., figs. 2259-2263.) The form with the hindwing cut square, as if by scissors, is described and named *ab. distorta*, Rothsch. ("Nov. Zool.," 1918, xxv., p. 75.) A specimen of *Thais polyxena*, Schiff., with extreme alteration of shape and pattern is figured ("Berl. Ent. Zeitschr.," 1910, lv., Taf. i., fig. 1.) A similar one is figured (Herrich-Schäffer, "Europäische Schmett.," 1843, vol. i., Taf. 116, figs. 557 and 558.)

Oenieria dispar, L. Enock bred 800 males and females in 1867, in nearly all of which the hindwings had a deep crescentic notch extending inwards as far as the discal area. A coloured plate is given ("Ent.," 1878, p. 169). The same form was bred again, and is mentioned as a constantly recurring aberration (ibid, 1884, p. 17). Numbers were bred again years later (1889, p. 259). Some bred by Mr. Bankes, from larvæ of American origin, are in the Brit. Mus. Teratological Coll. In these the females are much less affected. The uniformity of the defect and its constant recurrence point strongly to its being a mutation.

DEVELOPMENTAL ABNORMALITIES IN THE OVARIES.

Doncaster reports the discovery of a female *Abraxas grossulariata*, L., with six egg-tubes instead of four, but does not say whether the condition was bilateral. ("Journ. of Genetics," 1913-1914, iii., p. 6.)

I recorded a female *Agriades coridon*, Poda., with three egg-tubes on each side instead of four. It was a gynandromorphous specimen, *ab. roystonensis*, Pickett. ("Trans. Ent. Soc. Lond.," 1916, p. 252.) This year, 1921, I found the same condition in one specimen of the parallel gynandromorphous form of *Plebeius argus*, L.

ABSENCE OF ANTENNÆ.

Strymon pruni, L., female, bred without antennæ. ("Proc. South Lond. N. H. Soc.," 1891, p. 106.)

Manduca atropos, L. Right antenna absent. The antenna case of the pupa was very short and stuck out like a horn. ("Ent. Mag.," 1865-6, ii., p. 167.)

Zygena lonicera, Esp. Bred with one antenna absent. ("Societas Ent.," 1890-91, p. 75.)

Phragmatobia fuliginosa, L. Bred with an antenna absent. ("Ent. Mag.," 1880-81, xvii., p. 48.)

Cymatophora diluta, Fab., and *Scopelosoma satellitia*, L. Each with only one antenna. ("Proc. Ent. Soc. Lond.," 1871, p. vii.)

Sphinx ligustri, L. Right antenna absent, left represented by a knob, proboscis malformed, wings crippled. (Bristol, 1901. Brit. Mus.)

Parnassius apollo, L. Antenna missing. (Bryk., "Soc. Ent. Zurich," xxix., p. 20, fig.)

Zygena lonicera, Esp. Bred with only one antenna. (Klemensiewicz, "Soc. Ent. Zurich," 1890-91, p. 75.)

Larvæ of *Pieris brassica*, L., were fed between poles of a magnet. only one survived, and had rudimentary stumps in place of antennæ, the legs on the left smaller than on the right, and the wings on one side unexpanded. Controls were normal. (Slater, "Proc. Ent. Soc. Lond.," 1885, p. xv.)

ABSENT ANTENNA AND EYE.

Spilosoma menthastris, Schiff. The right antenna and eye are missing. There is a hollow where the eye should be, but it is concealed by scales, and it is impossible to see whether a rudimentary eye is present. (Montgomery. Bred Ealing, May 6th, 1900. Brit. Mus.)

ABSENT HEAD.

Phragmatobia fuliginosa, L. Head and neck missing. No scar on thorax, which had hair in front where the head ought to have been. (Nécsey, "Illustr. Wochenschr. f. Ent.," 1900, v, p. 170.)

ABSENCE OF WINGS.

This is quite common. Sometimes there is no trace of the missing wing, sometimes it is represented by a minute knob.

Zygena filipendula, completely apterous. Bred Folkestone. ("Proc. South Lond. N. H. Soc.," 1887, p. 79.)

Hybernia defoliaria. No wings on right side. ("Ent.," 1905, xxxviii., p. 22.)

Acronicta megacephala. Two wings only. ("Proc. Ent. Soc. Lond.," 1880, p. xxx.)

Hylophila bicolorana. No left forewing, rudimentary left hindwing. (H. Worsley Wood. Bred Wimbledon, 1919.)

Hemerophila abruptaria. Bred with no left forewing. ("Ent.," 1904, xxxvii., p. 328.)

Abraxas grossulariata (two with left forewing absent), *Anticlea cucullata* (left forewing absent), *Melitæa athalia* (right forewing absent).

The following specimens with a hindwing absent have been recorded. *Melitæa varia* ("Proc. Ent. Soc. Lond.," 1911, p. vi.), *M. artemis* ("Ent.," 1888, p. 257), *Limenitis sibylla* (ibid), *Erebia eriphyle* ("Proc. Ent. Soc. Lond.," 1911, p. vi.), *Erebia athiops* (two) (Tutt, "Ent. Rec.," 1908, xx., p. 221), *Abraxas grossulariata* (two) (Porritt, "Proc. Ent. Soc. Lond.," 1913, p. lxix.), *Notodonta ziczac*, *Pygerra bucephala*, *Dicranura vinula* ("Ent.," 1870, pp. 147, 178), *Pandemis ribeana* ("Soc. Ent.," 1890-91, p. 75), *Macaria notata* (Bird, "Ent. Rec.," 1905, xvii., pp. 311-315), *Ithysia hybr. harrisoni* ("Trans. Lond. N. H. Soc.," 1916, p. 19), *Melanippe subtristata* ("Proc. South Lond. N. H. Soc.," 1891, p. 106, and "Nat. Journ.," 1895, iv., p. 169), *Harpalycce galiata* ("Proc. Ent. Soc. Lond.," 1856, 4, p. 22), *Dianthoecia carpophaga* ("Bull. Ent. Soc. de France," 1853, p. xxxix.).

In the Brit. Mus. are the following:—*Mamestra persicaria*, *Cucullia asteris*, *Phibalapteryx vitalbata*, *Emmelesia alchemillata* and *E. unifasciata*, *Larentia hastata*, *Cidaria testata*, *Hybernia leucophaea*, *H. defoliaria*, *Camptogramma bilineata*, *Drepana falcataria*, *Lymantria monacha*, *Colias edusa*, *Melitæa artemis*, *Papilio machaon*, *Cænonympha pamphilus*, *Cacacia piceana*, and in my collection *Agrotiphila quieta* (Yukanski, 1917), *Nania typica*, Clapton.

Although one would expect a forewing to be absent more often than a hindwing, owing to its greater exposure to injury, a missing hindwing is about six times as common as a missing forewing.

The following two records suggest that injury cannot be the sole cause of absence of wings.

Barrett states that at West Wickham Wood, before the insect finally disappeared from this locality, three-winged *Macaria notata*, L., were not uncommon in both broods, one or other hindwing being entirely absent. One specimen with no hindwings was caught. ("Brit. Lepidopt.," vol. vi., p. 375.)

C. H. Sladen writes that he bred some *Cidaria testata* most of which lacked one hindwing, and one had both missing. They were fed on willow, had plenty of food, and the pupæ were left undisturbed. ("Ent.," 1887, xx., p. 306.)

Of interest also from this point of view is the record of a *Theretra (Deilephila) elpenor*, L., with three wings, bred from a perfectly normal pupa. ("Zeitschr. f. Wissensch. Insektenb.," 1911, vii., p. 398.)

Many leaden and some asymmetrical *Abraxas sylvata* were taken one year near York. Most were crippled and some lacked hindwings. ("Proc. Ent. Soc. Lond.," 1897, p. xlix.)

In these the absence of wings was probably developmental, and associated with the abnormal pigmentation, and not due to any mechanical injury.

SMALL ANTENNÆ.

Pieris brassica, L. One antenna very small but perfect. ("Proc. South Lond. N. H. Soc.," 1891, p. 121.)

Pyrameis atalanta, L. Left antenna half the usual length. ("Proc. Ent. Soc. Lond.," 1865, p. 115.)

Arctia caia, L. Right antenna small, right hindwing yellow, rounder than the left and abnormally marked. (Clement, "Bull. de la Soc. Ent. de France," 1914, p. 495.)

Pieris rapae, L., female. Right antenna a quarter the length of left. (Graves, "Ent. Record," 1921, xxxiii., p. 45.)

Apatura ilia, Hübn. Right antenna smaller than left. (Christeller, "Ent. Mitt.," 1917, vi., p. 81, fig.)

Manduca atropos, L. Right antenna 1mm. long, left 2mm. long. (Ibid, fig.)

Limnitis sibylla, L. Right antenna about one-third the normal length. H. Worsley Wood.

SMALL LEGS.

Arctia caia, L. Right metathoracic leg extremely small. Brescia, 1907. ("Chinaglia. Redia.," 1915, x., p. 10, fig.)

BOTH WINGS SMALL ON ONE SIDE.

Papilio krishna (Manders, "Proc. Ent. Soc. Lond.," 1907, p. lxiv.), *Zygana hippocrepidis* (Tutt, "Brit. Lepidopt.," i., p. 533), *Hipocrita jacobae* (Bird, "Ent. Record," 1905, xvii., pp. 311-315), *Arctia caia* (two) ("Proc. South Lond. N. H. Soc.," 1909, p. 91) and one ("Proc. Ent. Soc. Lond.," 1845-7, 4, p. 85), *Tephrosia consoniaria* (Robertson, "Ent. Record," 1902, xiv., p. 80), *Lancissa io* ("Trans. City of Lond. N. H. S.," 1911, p. 5), *Pyrameis atalanta* ("Proc. Ent. Soc. Lond.," 1865, p. 115).

In the British Museum, *Agrotis saucia*, *Plusia gamma*, *Abraxas grossulariata*, *Agriades thetis*, *Pyrameis atalanta*, *Noctua neglecta* (in my own collection), *Everes dipora*, *Aglais urticae*, *Cymatophora duplaris* (Brit. Mus.), *Telesia polyphemus* (Enderlein, "Zool. Jahrb. Abt. f. Anat. u. Ontog. d. Tiere." 1902, xvi., p. 37), *Agrotis placida* and *A. introfrens* ("Proc. Ent. Soc. Wash.," ii., p. 181).

BOTH FOREWINGS SMALL.

Diacrisia rubida (mere scales) ("Ent. Mag.," 1900, xxxvi., p. 197), *Heteromiza obliquaria* (mere scales) (Brit. Mus.), *Zygana filipendula*, both forewings and left hindwing minute, right absent (Brit. Mus.), *Triphana comes* ("Proc. Ent. Soc. Lond.," 1855, 3 n.s., p. 80).

ONE FOREWING SMALL.

Pyrameis atalanta (three) (Tutt, "Trans. City of Lond. N. H. S.," 1891, p. 15. "Proc. South Lond. Ent. Soc., 1899, p. 108), *Colias edusa* (Agassiz, "Mitth. Schweiz. Ent. Ges.," 1897-1903, x., p. 22), *Argynnis aglaia* ("Ent. Record," 1908, xx., p. 148), *Agriades coridon*, male (E.A.C.), *Hyponomeuta cognatella* ("Ent. Mag.," xxv., p. 306), *Apocheima hispidaria* ("Proc. Ent. Soc. Lond.," 1900, p. v.), *Hybernia leucophaea* (three males) (E.A.C.), *Abraxas grossulariata* (four), *Boarmia repandata*, *Acidalia inornata* (small wing pale), *Zonosoma punctu-*

larva, *Anticlea badiata*, *Triphana subsequa*, *Zyggana filipendule*, *Caradrina quadripunctata*, *Heliophobus hispidus*, *Noctua triangulum* (C. Nicholson), *Hoporina croceago*. In some cases the small forewing is very perfect in shape and neurulation.

BOTH HINDWINGS SMALL.

Macaria notata ("Proc. Ent. Soc. Lond.," 1856, 4, p. 22), *Deilephila pusaria*, *Agrotis comes*, *Anarta myrtilli*, *Eupithecia coronata*, *Biston betularia*, *Manduca atropos*, *Arctia caia* (Brit. Mus.), *Acrionicta megacephala* (C. Nicholson), *Lycia hirtaria* ("Ent. Record," 1898, x., p. 154).

ONE HINDWING SMALL.

Melitæa deione (a rather common defect in this family. Pearson, "Ent. Record," 1908, xx., p. 54), *Dryas paphia* ("Ent.," 1919, p. 28), *Erebia* var. *adyte* ("Proc. Ent. Soc. Lond.," 1911, p. vi.), *Parnassius apollo* (Mühling, "Ent. Zeitschr.," 1913-14, xxvii., p. 305), *Thecla ilicis* ("Soc. Ent.," 1890-91, p. 75), *Aricia medon* ("Ent.," 1919, p. 284), *Amorpha populi* ("Nat. Journ.," 1895, iv., p. 163), *Macaria notata* ("Jenner Weir. "Proc. Ent. Soc. Lond.," 1856, iv., p. 22), *Hybernia leucophæaria* ("Ent. Record," 1902, xiv., p. 129), *Amorpha populi* and *Zyggana filipendule* (Fletcher, "Nat. Journ.," 1895, iv., p. 163), *Epinephle amaryllis*, *Aglais urtica*, *Pyrameis atalanta*, *Melitæa athalia*, *Pamphila palemon*, *Aricia medon*, *Planema aganice*, *P. umbra*, *Agriades thetis*, *Lencania conferta*, *Dryobates protea*, *Xanthia flavago*, *Miana furcuncula*, *Hygrochroa syringaria*, *Boarmia roboraria*, *B. cinctaria*, *Abraxa grossulariata*, *Eucosmia certata*, *Coremia propugnata*, *Selidosema plumaria*, *Opisthographa clathrata* (2), *Eupithecia pulchellata*, *Hybernia defoliaria*, *Hemaris tityus*, *Sphinx ligustri*, *Osiocampa castrensis*, *Gastropacha quercifolia*, *Bombyx quercus*, *Oidaria siterata*, *Phibalapteryx tersata*.

These lists are taken at random and bring out the fact that small hindwings are much commoner than small forewings, just as the absence of hindwings is commoner than that of forewings. They also show that all families are affected in this way, though perhaps *Geometridæ* are most prone to this kind of defect.

Occasionally all the wings may be small.

Lycia hirtaria, with wings represented by mere rudiments. (Robbe, "Ann. Soc. Ent. Belge.," 1892, xxxvi., p. 514.)

Eupithecia scabiosata, both forewings and right hindwing rudimentary, left hindwing very small. (British Museum.)

ABSENT CLASPERS.

Papilio machaon, L. Larva with only one clasper on the 7th segment. It was lost at the second ecdysis.

Aglais urtica, L. Larva with no claspers on 8th segment, where there was a black scar.

Both were probably due to injury, though none was noticed. (Chrétien, "Le Naturaliste," 1887, p. 185).

ABSENT SPIRACLE.

Telea polyphemus, Cram. Full-grown larva with spiracle of 8th abdominal segment missing and replaced by a wart-like protuberance. The stripe on this segment was absent. The larva was parasitised, which may account for the condition. ("Ent. News. Phila.," 1913, xxiv., p. 195.)

ABSENT ABDOMEN.

Eugonia polychloros, L. Of three pupæ one was opened to show to a friend. The wings, legs, and antennæ were normal, but there was no trace of the abdomen. The insect was alive, and next morning crawled about with three fully developed wings, and had a large transparent body on it. This was no doubt extruded from the thorax. (Tillyard, "Nat. Journ.," 1895, iv., p. 180.)

Melitea cinxia, L. Amongst a number of pupæ from collected larvæ the abdomen of one shrivelled. It was put apart and an imago emerged with crippled wings and without abdomen. The posterior end of the thorax had a rough appearance. There was no trace of abdomen in the pupa case. (H. Worsley Wood, I. of Wight, 1920.)

Manduca atropos, L. A specimen with normal wings, thorax without the death's head, abdomen very short, as if cut down to less than half its length. In the figure only the first two segments are visible. The rest are missing or very small and retracted. (Ernst, "Papillons de l'Europe," 1779, vol. iii., pl. cxxii., fig. 154n.)

MALFORMATIONS PROBABLY DUE TO INJURY.—ABNORMAL ANTENNÆ.

Pupa of *Sphinx (Hyloicus) pinastri*, L., with antenna sheaths malformed, forming a ring. (fig., "Illustr. Wochenschr. f. Ent.," 1896, i., p. 563.) Pupa of *Iphiclides podalirius*, L. Antenna sheaths stuck out like handles. (Ibid, 1897, ii., p. 479.)

Lymantria, hybrid. Abnormal hypertrophied antenna. (Lindner, "Zeitschr f. Wissensch. Insektenb.," 1913, ix., p. 377, fig.)

Arctia caia, L. Female bred with antennæ very short, resembling clubs of butterfly's antennæ. Pupa case showed abnormal position of antenna sheaths. Full description given. ("Proc. Ent. Soc. Lond.," 1886, xix., p. xlix.)

Melitea cinxia, L. Apical half of antenna aborted. ("Proc. Ent. Soc. Lond.," 1871, p. vii.)

Zygana filipendule, L., with both antennæ twisted back on themselves, forming a ring in the centre. Brit. Mus.

Samia cynthia, Drury, male. Right antenna much hypertrophied, with structure quite irregular.

Psilura monacha, L. Left antenna with a flat plate of chitin bent out in the middle. (Lindner, "Zeitschr. f. Wiss. Insektbiol.")

It is quite usual to meet with shortening of one antenna, due to failure of the end to develop properly, and this is often associated with some malformation of the of the forewing of the same side. Some examples are given by Christeller. (Ent. Mitt.," 1917, vi., p. 81.)

HOLES IN THE WING.

Cosmia trapezina, L. Five large holes in right forewing and two in right hindwing. ("Berl. Ent. Zeitschr.," xxxii., pp. 208 and 227, fig.)

Pyrameis atalanta, L. Round hole between veins 3 and 4 left forewing. ("Proc. South Lond. N. H. Soc.," 1899, p. 108.)

Euchloë cardamines, L. Round hole between veins 3 and 4 left forewing, and large hole left hindwing, with discocellular nervure displaced outwards round it. ("Trans. Lond. N. H. Soc.," 1915, p. 74.)

Polyommatus icarus. Large hole in left forewing.

Terias, sp. Hole in right forewing. (Ibid.)

Xanthia fulvago, L. Hole in left hindwing near margin, and slit in termen of left forewing, opening into large round hole. The positions of holes in the two wings correspond. Two very deep notches in right hindwing and one in right forewing, all near apex. (Brit. Mus.)

Chapman considers that such holes are due to injury to the pupa just after having cast the larval skin. He had a larva on which a piece of sawdust fell just after it pupated. The wings afterwards covered it in, and there was a hole in the same position in the wing of the imago. ("Ent. Record," 1890-91, i., p. 272.)

McArthur bred an *Arctia caia*, L., with perforated wings, caused by the larva pupating on the sandy floor of the cage. A piece of grit pierced the wing case. There was also an indentation of the hindwing perfectly ciliated, which was probably caused by another piece. ("Nat. Journ.," 1897, vi., p. 148.)

A number of species with holes in the wings are figured by Christeller. ("Ent. Mitt.," 1917.)

Rounded indentations are sometimes produced in the posterior margins of the forewings or of both pairs of wings in Lepidoptera, which attach the pupa by a silken belt. In the British Museum are two *Gonepteryx rhamni*, females, with the mark of the silken belt across the forewings and a rounded indentation in the posterior margin of each, and an *Aporia crataegi* with the posterior margin of the left forewing slightly indented, and that of the right deeply indented. *Pieris brassicae* indented by silk girdle in all four wings. (Main, "Ent. Record," 1904, xvi., p. 298.)

Iphiclides podalirius, with termen of each forewing indented is figured by Christeller ("Ent. Mitt.," 1917, vi., p. 110).

Many other malformations, doubtless due to injuries, have been recorded.

Symmetrical notches in both forewings, both wings on one side, or in all four wings, ciliated or not ciliated, are well known.

Ocneria dispar. Symmetrical ciliated notches in both forewings. Two bred. (Taylor, "Nat. Journ.," 1898, vii., p. 186.)

Oporabia autumnata. Notch in each forewing. ("Proc. South Lond. N. H. Soc.," 1900, p. 106.)

Zygona achillea. Similar specimen. ("Ent. Record," 1915, xxvii.,

p. 98.) *Syrichthus malvæ*. Ciliated notch at apex in all four wings. ("Proc. South Lond. N. H. Soc.," 1896, p. 47.)

Indentations of the termen, generally broad and shallow, are common in both wings on one side, both forewings or all four wings, or in one wing only.

Oberthür figures three specimens of *Parnassius apollo*, two with this deformity of the right forewing, and one with it in both wings on the right side. ("Études. Lep. Comp.," 1891, xiv., pl. ii.)

Deilephila euphorbiæ. Termen symmetrically indented in forewings. ("Ill. Wochenschr. f. Ent.," 1898, iii., p. 232.)

Lycana semiargus. Deep notch symmetrically placed in all four wings. (Fromholz, "Berl. Ent. Zeitschr.," 1880, xxxii., p. 225, pl. ii.) In the British Museum are specimens of *Pachnobia hyperborea*, *Hypocrita jacobæ*, *Papilio machaon*, with both forewings, and *Parasemia plantaginis* with all four wings affected, and two *Agriades thetis* with the two wings on one side only indented. Indentations of the costa, symmetrical or unilateral, are fairly common. Sometimes the proximal part of the costa forms a sharp hooked projection. A figure of *Lastiocampa fasciatella* with this condition of the left forewing is given. ("Ill. Wochenschr. f. Ent.," 1898, iii., p. 98.) In the British Museum is a male *Hybernia defoliaria* with the condition more marked on the right side.

Tephrosia crepuscularia, both costæ symmetrically affected. ("Proc. South Lond. N. H. Soc.," 1906, p. 41, fig.)

Zygena achilleæ and *Pararge mæra* with symmetrical depression of costa; nervures normal. (Chapman, "Proc. Ent. Soc. Lond.," 1914, p. lxxxiv.)

Psilura monacha. Both wings on the left side narrow, anterior margins depressed and apices very sharp. ("Berl. Ent. Zeitschr.," 1909, p. 54, Taf. i.) There is a somewhat similar specimen of *Æneis noronæ*, Thnb., in the British Museum.

Amongst several examples of Lepidoptera with abnormal wings a most remarkable *Saturnia pyri* is described and figured. The wings on the right side were deeply hollowed out, and the hindwing margin was at one point prolonged into a sharp process extending far beyond the limit of a normal wing. (Aigner-Abafi, "Illustr. Wochenschr. f. Ent.," 1900, v., p. 99.)

Symmetrical malformations in the following species are described and figured, *Vanessa io* with the posterior half of each forewing missing, *Saturnia pyri* with deep incurving of the costa of each forewing, *Antheræa pernyi* with a deep excavation at the apex of all four wings, *Gastropacha quercifolia* with a crescentic piece missing at the anal angle of each hindwing, and *Notodonta dictæoides* with the termen concave in each forewing. Some asymmetrical malformations are also figured. (Gauckler, "Illustr. Wochenschr. f. Ent.," 1897, ii., pp. 84-87, and pp. 374, 417, 418. O. Schultz describes others (ibid p. 143).) A symmetrically malformed and pale *V. io*, bred during temperature experiments, is figured (ibid p. 417).

A truncated condition of the apex of the forewing is not uncommon.

There are several examples in the British Museum. Shortening and broadening of the whole of a forewing with concavity of the termen may occur. Two specimens of *Aglais urticae* in the same collection show this deformity. Both are probably due to pressure of the apex on termen against some hard object just after pupation.

The British Museum has a specimen of *Nonagria geminipuncta* with left hindwing produced into a narrow ribbonlike strip, much longer than the normal hindwing, and a *Zygæna filipendulæ* with both forewings appearing as if cut off with a pair of scissors, leaving a sharp V-shaped incision, extending to the spots nearest the base, and with the hindwings small.

A *Telea polyphemus* is figured in which all the wings are abnormally shaped, and those on the right are different from those on the left, but all are perfect. ("Psyche," 1904, ii., p. 113, pl. x.)

The pattern in abnormal wings is often abnormal also.

Caradrina ambigua. Left forewing broad and indented, reniform and orbicular joined into large patch. ("Proc., Ent. Soc. Lond.," 1894, p. xl.)

Cheimatobia brumata, with only three wings, differing in colour and markings. ("Ent.," 1872-73, p. 53.)

Opisthograpta clathrata. No left hindwing, abnormal darkening left of forewing. (E.A.C.)

Rumicia phlaeas. No left forewing, left hindwing suffused. (Tutt, "Brit. Butt.," vol. i., p. 380.)

Arctia hebe. Left side normal, right a uniform brownish colour and subdiaphanous. ("Berl. Ent. Zeitschr.," 1910, lv., p. 495, pl. vii.)

Zygæna filipendulæ ab. *flava*. Left forewing small and with large yellow area near base spreading out from the spots. (E.A.C.)

Plusia gamma. Right forewing dwarfed and with large bleached patch. ("Trans. City of Lond. Ent. Soc.," 1911, p. 12.)

Argynnis aglaia. Left wings both smaller than right and with white patches in them. ("Proc. South Lond. Ent. Soc.," 1904, p. 82.)

Tenaris, sp. Forewing on left side with distorted nervures. In left hindwing nervure 3 is bent aside to touch 4 near the ocellus, but reaches the margin in the usual place. The ocellus lies as usual between 2 and 3, but the ring round it instead of just crossing 2 and 3, does not quite reach 2, and is produced forwards considerably beyond 5.

Instances of this kind could be multiplied indefinitely, but they are especially common in the *Lycænidae* in association with striated and obsolete forms. Tutt, in "British Butterflies," vol. i., p. 7, has commented on this in the case of *Agriades coridon*, and Pickett ("Trans. City of Lond. Ent. Soc.," 1905, p. 52) mentions how often obsolete forms have some deformity of the wing, small holes in the membrane, or one wing missing or rudimentary.

The association of bleaching with various malformations appears to be of some importance.

Direct evidence of the cause of any given malformation is seldom obtained. I have quoted two definite cases of holes in wings of which the cause was known. Chapman records a *Libythea celtis* with a

shortened wing, the result of a displaced antenna in the pupa ("Proc. Ent. Soc. Lond.," 1910, p. lx.), and Bird noticed a scar on the 2nd or 3rd segment of a larva of *Pararge aegeria*, which afterwards produced an imago with the 3rd and 4th nervures of the right forewing curving away from one another, and with the termen between them forming a triangular projection. ("Ent. Record," 1905, xvii., pp. 311-315.)

Manduca atropos, L. Two small parasites emerged from holes in the wing cases of two pupæ, and the imagines had holes the size of a quill in the upper wing on each side near the edge. Tutt quotes this doubtful record. ("Brit. Lepidopt.," vol. iv., p. 434.)

Epinephele tithonus, L. I have bred specimens, one with a hole in one forewing and a semi-circular gap in the posterior margin of the other, and two with semi-circular gaps in the termen of a forewing. The defects were caused by local pressure on the pupa applied a day or two after pupation. The pupa must be hard enough for pressure to cause a distinct indentation of the wing case. Great distortion of a very soft pupa does not prevent perfect wing development.

Harrison remarks on the frequency of teratological hybrids lacking portions of wings, or showing portions developed to an exaggerated extent. He thinks this may be due to irregular chromosome division at a late stage of development. ("Journ. of Genetics.," 1916-1917, vi., pp. 115 and 126, pl. iii., fig. 3, No. 1, and fig. 4, Nos. 2 and 4.)

There may be other records but I am unaware of them.

The symmetrical indentation of the costa of each forewing is probably due to incomplete casting of the larval skin. The larval head becomes fixed at some point along the anterior aspect of the pupa and causes a concave indentation, which includes the front of both wing cases. The deformity is figured and described in *Epinephele jurtina*, L., as *ab. costa-cava*, Cabeau. ("Rev. Ent. Soc. Namuroise," 1904, p. 58.)

WAVY NERVURES.

Nectaria tondana, Voll. Every nervure in all four wings wavy instead of straight, including the costal. The wing membrane quite smooth and tightly stretched, and with normal scales. Specimen full size. (Brit. Mus.)

Melanitis leda, Fabr. Nervures in the same condition, but the membrane is a little wrinkled and the scales rather deficient in pigment. Specimen full size. (Brit. Mus.)

Aporia crataegi, L. An illustration of a specimen with undulate nervures and deep notches in all four wings, caused by a tight pupal girdle, is given by Krancher ("Psyche," iv., p. 202). The specimen is narrow winged and small in size.

Papilio restructus *ab. undulosus*, Oberth. Female, Tibet. Well expanded and symmetrical, but with all the nervures wavy. Pigmentation normal. Oberthür states that he has never seen this form of variation before. ("Études. Lep. Comp.," 1911, v., pt. i., pl. lxxviii., fig. 651.)

GENITAL MALFORMATION.

A peculiar malformation of the male genitalia has been recorded once in *Acrionicta tridens*, Fab. ("Proc. South Lond. Ent. Soc.," 1910-11, p. 50), once in *Hydræcia paludis*, Tutt; Burrows, ("Ent. Record," 1912, xxiv., p. 169), and twice in *Fumea casta*, Burrows (ibid, 1918, xxx., p. 82). In these insects the penis, penis sheath and valves remained as internal organs. Chapman states that he has produced the condition artificially in *Ocneria dispar*, L., by a slight injury to the larva between the 9th and 10th abdominal segments in the midventral region. The penis and sheath develop from the internal part of a small mass of tissue called Herold's corpuscle, the valves from a small invagination of the posterior margin of the 9th abdominal segment, which unites with the internal part of the corpuscle.

Meisenheimer excised the whole corpuscle in *Ocneria dispar*, L., larvæ, and his imagines had no penis, sheath, or valves. ("Trans. Ent. Soc. Lond.," 1912, p. 407.)

Valves in the intra-abdominal position are not uncommon in the intersexes, which replace females, in *Amorpha hybrid hybridus*, Steph., but in this case it is due to an arrest of development without any injury.

DEFECTS OF SCALE DEVELOPMENT.

1. Complete absence, local or general. Diminution in number, sometimes associated with very narrow scales, local or general.
2. Narrowness of scales, local or general.
3. Absence of hairs on the wings, thorax and abdomen.
4. Scales with absence or deficiency of pigment and unduly thin, so that they curl up at the edges, or are rolled up so as to form a pointed extremity. This usually gives the wing a white appearance, and is the condition found in most albinistic forms.
5. Scales normal in number or diminished, with little or no diminution in the amount of pigment but some alteration in its colour, turned upwards and bent over, or twisted into a spiral. The scale is often twisted so tightly that the distal half or two thirds resembles a coarse hair.

In some cases only the upper layer of scales is affected; in others both layers and the wing membrane in this case is exposed.

6. Scales with the proximal part flat, but with the extremity turned sharply upwards so as to point vertically and lie at right angles to the wing membrane.

SYMMETRICAL DEFICIENCY OR ABSENCE OF SCALES.

In Lord Rothschild's collection there are single specimens of *Abraxas grossulariata* and *A. sylvata* entirely without scales.

In Mr. Bright's collection the following specimens with deficient scales exist. *Thecla quercus*, scales few on the underside of all four wings. *T. w-album*, hindwings semitransparent owing to irregular absence of scales; scale sockets present. Two *Satyrus semele* with pale

cream coloured wings. Upper scales without pigment and reduced in number, under scales transparent. Sex brands normal.

Euchloë cardamines, L., male. Both hindwings nearly transparent in central and basal areas. Scales very few and narrow and in places only represented by short, thin, white hairs. Colchester bred.

Argynnis aglaia, L. Outer part of all four wings transparent, fringes perfect. A few scales are present, but the sockets for the normal number are visible. ("Ent.," 1921, liv., p. 79.)

Melitæa artemis. Scaleless except base of wings and fringe in all four wings. Sockets present. Galway, bred.

Endromis versicolor, L. Basal and central areas scaleless.

Odontoptera bidentata. Base and central area partly scaleless. (Two in Rothschild Coll.) I bred two similar specimens from inbred stock.

Pararge ægeria, female. Scales deficient in number all over the wings except the marginal area. Fringes perfect. Scale sockets deficient in number. Scales normal. One of a number bred from eggs (Limber, October 12th, 1916). Larvæ and pupæ kept in closed tin. Other normal specimens bred with this.

Agriades coridon, female. Outer half of each forewing transparent. Nearly all the scales are absent, especially towards termen, but the fringes are perfect. The few scales present on the transparent part, and many at the junction between the transparent and normal part of the wing, are unpigmented, thin, and curled up. (Royston, Bright Coll.)

Cyaniris argioides, female. Almost symmetrical absence of scales between the nervures in the black apical part of each forewing. Fringes normal, black scales present along nervures, costa, and at line of junction with the blue part of the wings.—H. B. WILLIAMS.

Hippocrita jacobæ. Subdiaphanous specimen with outer three-quarters of hindwings grey. The scales are narrow and deficient in number. On the grey part of the hindwing the scales are thinly pigmented and grey in colour. (F. Mann, Mickleham Down, 6.6.15.) A similar specimen is recorded from Oxshott. (Buckstone, "Ent. Record," 1915, xxvii., p. 143.)

Diaphora mendica var. *rustica*, two females. Scales too narrow and few in number. A male has no black scales, and on the hindwings the scanty scales are almost as narrow as hairs. (Inbred specimens. Many larvæ died of disease.)

Saturnia pavonia. Deficiency of scales is rather common in this species. There is one in the British Mus. Teratological Coll., another is mentioned by Bateson. A specimen from a starved larva is mentioned by Tiltcher. ("Ent. Zeitschr.," 1912-13, xxvi., p. 54.)

Aporia crataegi, L., scaleless. (Slevogt, "Ent. Wochenbl.," 1907, xxiv., p. 180.)

Lasiocampa quercus var. *callunæ*. A male and female almost destitute of scales, especially over outer part of wings. The larvæ were fed on ivy, and other imagines were normal (Varley Coll. Mosley's Illustrations). A similar specimen, a female, is in the British Museum

General Collection. Another is recorded ("Proc. South Lond. N.H. Soc.," 1895, p. 47).

Euvanessa antiopa, L. No scales on the wings except on the marginal area. The pupa was exposed to a high temperature. (fig., "Illustr. Wochenschr. f. Ent.," 1897, ii., p. 162.)

Thais rumina, L. Subdiaphanous specimen with scales well formed and pigmented, but widely spaced, showing wing membrane between (Brit. Mus.).

Lophopteryx carmelita, almost scaleless. *Catocala lupina* and *Pygma pigma*, thinly scaled. ("Berl. Ent. Zeitschr.," 1896, xli., p. (8).) *Saturnia pavonia*, *Platysamia cecropia*, *Saturnia pyri*, thinly scaled. Cold weather delayed scale formation. (Englisch, "Ent. Zeitschr.," Stuttgart, 1908, xxii., p. 55.)

The condition appears to be due to various unfavourable conditions, such as unsuitable food, starvation, cold, and weakness due to inbreeding.

NARROW SCALES.

Aglais urticae. Both wings on the left side semitransparent. Scales very few and narrow. Much membrane visible between them. (Bright Coll.)

Cænonympha pamphilus. Wimbledon, 1919. Pale area near posterior margin of left forewing. Upper scales extremely narrow and normally pigmented, but showing the pale under scales. (H. B. Williams.)

Pararge aegeria. Two males bred from ova. Limber. Pale subdiaphanous patches on all four wings, which are incompletely expanded. Larvæ fed in closed tins in a warm room. Most of those bred were quite normal. Upper scales fully pigmented, but almost hair-like and tilted up at the extremity.

Pararge aegeria. All scales very narrow, showing membrane between. The cream-coloured spots appear greyish. Bred, C. Nicholson.

Rumicia phleas. Wimbledon 26.viii.15. Larva starved by accident. Undersized male. All the scales are too narrow but not deficient in number. The black pigment is scanty at the ends of the black scales, and the orange pigment in the copper scales, giving both a pale appearance H. B. Williams.

ABSENCE OF HAIRS.

Aglais urticae. A brood dull in colour, with no hairs on the body or wings. They were very weak, and died the day after emergence. ("Proc. South Lond. N. H. Soc.," 1887, p. 77.)

LOCAL ABSENCE OR DEFICIENCY OF SCALES.

Melitæa artemis. Posterior half of left forewing without scales; fringe perfect; sockets present. (Bright Coll.)

Polyommatus icarus, female. Small patch with no scales near termen; fringe normal. (Bright Coll.)

Agriades coridon, female. Large bare area near base of left forewing. Pale streaks radiate from this towards the termen. At the base scales are absent, sockets present; further out scales are present, but almost transparent. (Royston, Bright Coll.)

Eucanessa antiopa. One forewing with no scales on under surface. (Rothschild Coll.)

Bupalus piniarius, female. An area along termen of left forewing near apex has no scales, but sockets are present. (H. Worsley Wood. Bred, Oxshott, 5.15.)

Rumicia phlaeas. A pale area runs from the disc between nervures 4, 5, and 6 to termen. Near the disc the scales are thin, transparent, and curled up, then there is an area without any scales extending to the fringe, where the scales are transparent. Scale sockets present. H. B. Williams. (Bexley, 8.09.)

Thecla w-album. The left forewing has three large stripes completely scaleless, one running along the posterior margin from the base almost to the termen. There were also four small patches without scales. Scale sockets are present. The line of division between the parts covered thickly with normal scales and the part which is bare is quite sharp. (Bred E.A.C., Horsley, 1919.)

Zygena jilipendula. A large circular area over the corresponding parts of the left forewing and the left hindwing. There are no scales over the area in the forewing, and very few in the hindwing. (Brit. Mus.)

Epinephela jurtina, female. There is a hole through the wing near the base, cutting the median nervure in two, and two smaller holes close to the termen, between nervures 2 and 3. Just internal to these there is a scaleless patch with normal scale sockets. The rest of the interneural space is cream-coloured, and the scales are thin, transparent, and rolled up. (H. B. Williams, Chilterns, 8.1919.)

E. jurtina. Right hindwing has a piece scalloped out at the anal angle. From the base to this part of the wing there are no scales, except a few patches of transparent curled-up scales along nervures 1a and 1b.

Erebia eryphile, with round white area in both wings on one side, covered with thin rolled-up scales. In the hindwing there is a small round hole with no scales at all in the area around it.

Boarmia repandata, with a small patch placed symmetrically in each forewing without scales, but with scale sockets present. No other abnormality. (A. W. Mera.)

There can be little doubt that local injury is the cause of many of these scaleless patches. The association with holes in the membrane and with rolled-up thin scales is evidence of this. It is also supported by the cases in which scaleless patches in a fore- and hindwing of the same side coincide.

LOCAL SCALE DEFECTS.

I have examined a very large number of specimens showing patches of white or pale colour, often described as bleached specimens, and

almost without exception have found the scales on these patches thin, transparent, or nearly transparent, and curled at the edges or rolled up completely. The condition very often affects corresponding areas on both wings of the same side, or on all four wings. As in the case of malformations, which appear alike in both wings of one side, or in all the wings, this affords strong evidence that local injury may be the cause. This is also supported by their association with holes in the wing or damaged nervures.

Direct evidence is given by Dr. Chapman, who accidentally pressed a pupa of *Pyraustis atalanta* between the lid of a jar and the glass edge, and left it for 24 hours. A deep impression was left across the wing case, which gradually became shallower. There was a bleached area across the red band of the forewing in the imago and some bleaching of the hindwing. ("Ent.," 1894, p. 28.)

Christeller, by exerting continuous pressure on pupæ of *Lymantria (Ocnaria) dispar*, obtained, in addition to deformities of the wings and antennæ, scale defects local, and in one case general. ("Ent. Mitt.," 1917, vi., pp. 193-224.)

Katheriner found that one of the effects of extreme cold on pupæ of *Aglaia urticae* and *Euranessa antiopa* was the production of spots of albinism. ("Illust. Wochenschr. f. Ent.," 1900, v., p. 321.)

Federley in his temperature experiments obtained specimens with symmetrical white spots, due to atrophic scales, and in one case had a specimen universally affected. ("Festschr. f. Palmén.," Helsingfors, 1905-1907, ii., p. 16.)

Englisch states that cold weather delayed scale formation, and probably produced atrophic scales in *Saturniidae*. ("Ent. Zeitschr.," Stuttgart, 1908, xxii., p. 55.)

Neither of these causes accounts for the condition in a brood of *Rumiccia phlaeas*, bred by Mr. H. B. Williams, in 1920, from Wimbledon eggs. Five females and two males had symmetrical pale patches near the middle of the posterior margin of both forewings, and one male had a similar patch on the left forewing only. The scales in all these were abnormal.

The larvæ were well fed under normal conditions and the pupæ were not touched, and were in positions where no pressure was possible. The imagines were large and the brood was a healthy one.

Dods reports a brood of *Ocnaria dispar* in which many males had large asymmetrical white patches on the wings. They had been inbred for three generations from normal ancestors. He does not say under what conditions they were kept, but injury and abnormal temperature seem to have been unlikely causes. ("Proc. South Lond. N. H. Soc.," 1908, p. 74.)

I have found abnormal scales in the following species, with large white areas in the centre of all four wings, in several *Epinephele jurtina*, in *E. tithonus*, *Erebria goante*, *Cænonympha pamphilus*, in *Brenthis epithore* with a round white area in both wings on one side; in *Argynnis aglaia* with small symmetrical white patches near the apices of the

forewings, *Dryas paphia* with both hindwings whitish, and *Argynnis aglaia* with large areas of both hindwings nearly white.

The same condition was present in the forewings in *Melitaea athalia*, with the ground colour replaced by cream and the black markings by grey. The hindwings were normal. In one *Euchloë cardamines*, with a white streak running through the orange and black along the costa, a white spot in the orange and a white patch in the posterior part of the orange tip, and in another with all the black of the left forewing replaced by white; the same scale defect was present.

The same condition is present in a *Pararge megara*, with the black part of both hindwings except the ocelli, replaced by cream colour, in two *Aglais urticae* with symmetrical pale areas in both forewings, in a *Pyrameis atalanta* with a large part of the black of both fore- and hindwings replaced by pale brown, and part of the red band symmetrically pale on both sides. Canterbury. Specimens of *E. jurtina* with the whole of one forewing white showed extreme alteration of scales, and also showed evidence of injury near the base of the wing.

Many examples of *Rumicia phleas* with patches of copper replaced by white, were in the same condition.

In the majority of the specimens examined it is easy to understand how local injury may be the cause, in others it is difficult to imagine that injury could produce the defect, for instance, in those in which both hindwings are affected and the forewings are normal.

In *Dryas paphia* it is not very unusual to find a white spot on all four wings, or on both the wings of one side, in which the scales of the ground colour are always defective, and sometimes those of the black spots also. The positions are nearly always the same, in the forewing between nervures 5 and 6, near the apex, and in the hindwing between nervures 4 and 5. These positions would coincide in the pupal condition. Local pressure is the probable cause, but it is hard to understand what the pressure can be which acts so uniformly on such a definite area.

In Heterocera local scale defects are fairly common. I have examined them in *Bupalus piniarius*, *Abraaxas ulmata*, *Xanthia ocellaris*, and *Callimorpha dominula*. In the last species the glossy green forewings have dull and faded-looking patches with a pinkish colour, when the light falls at a certain angle. The scales are all thin, but some are partially pigmented and others transparent.

GENERAL AND SELECTIVE SCALE DEFECTS ASSOCIATED WITH DEFICIENCY OR ABSENCE OF PIGMENT.

Many well-known aberrations are pathological. In some all the scales are curled or rolled up, abnormally thin and deficient in or devoid of pigment. More often the scales forming one part of a simple pattern, or more than one part of a more complex pattern are quite abnormal, but the other scales attain to their normal development, or at the most are a little deficient in pigment. Cases are known in which in the same genus, and even in the same species, all the scales of one part of the pattern may be affected in one specimen and all the scales

of the other part in another. One may call these complementary forms. Some of these are very rare, and all must be examined microscopically to prove the existence of a defect of the scales. I am greatly indebted to Lord Rothschild, Mr. P. M. Bright, and Mr. J. J. Joicey, for allowing me to examine the specimens in their collections, Mr. J. H. Durrant for allowing access to the Banks and Doubleday collections, and to Mr. H. B. Williams, Mr. H. Worsley Wood, Mr. R. W. Robbins, Mr. G. Talbot, and Mr. C. Nicholson, for their help.

RHOPALOCERA. — PAPILIONIDÆ. — *Parnassius*. The yellow-spotted aberrations of this genus are nearly all due to deficiency of pigment, associated with thinness and rolling up the scales. In species with white scales, in the centre of the spot, these are unaltered. Species which have blue scales in the black band near the margin, or in the black spots near the anal angle of the upperside of the hindwings, show even more marked changes in these scales, which are often shrivelled and colourless. The light-coloured scales forming the general ground colour are seldom abnormal, and the black ones are always normal.

The specimens in the British Museum, in the Hill Museum, and at Tring, given in the following list, all show well marked scale defects in the spots in which cream colour, yellow or orange, replaces the usual red colour.

Parnassius epaphus, Oberth., male, Kutie Pass, McArthur; female, top of Barren Mt., Thibet; female, Chonging Valley, *P. jacquemonti*, Boisd. Two males, Barra Larcha. Leech Coll. *P. sikkimensis*, Elw. A female, Sikkim, and a male. Walton. Sikkim, 1904, and two Yatung, Thibet. *P. styx*, Stgr. Orange spots with rolled scales, and blue scales also rolled up. *P. simonius*, Stgr. Tartary. *P. hardwicki*, Gray. Four specimens with yellow scales rolled, two of them with blue scales shrivelled up, and another of them with some scales of the ground colour curled. *P. himalayensis*, Elw. Some blue scales curled up as well as the yellow ones. *P. actius*, Evers., male. Blue scales, thin and shrivelled. *P. acco*, Gray, female, Lupsang. *P. delphius*, Ev., Tian Chian, and a second specimen Elwes Coll., both of which have the blue scales altered as well. *P. delphius* ab. *namangana*, Stgr., male, Turkestan. *P. delphius*, Honr. f., *marginata*, female, Turkestan. Scales, in yellow spots rolled to a point, and blue scales looking like colourless hairs. *P. orleansi groumi*, Oberth., *P. apollonius* f. *flavomaculata*, Aust., Mongolia.

P. imperator, Oberth., with large cream-coloured spots, in which the scales are curled up, and rather large blue spots, in which the scales are thin and rolled up.

P. apollo, L. Two females, Bignasco, 450-800 metres, and another Mergoscia, N. C. Rothschild, with curled-up orange scales. A male, Ragatz, 1903, has the yellow scales in the spots rolled up.

P. smintheus var. *belvri*, Edw. Yosemite. All the scales of the pale ground colour are pigmented but curled up, those in the cream-coloured spots are very deficient in pigment and rolled up. Specimens of this local race, with yellow spots, which are in the British Museum, have

normal scales, and it is probably a true colour variety. This specimen may be regarded as a defective yellow-spotted specimen, comparable to the defective red-spotted ones in the other species.

Since I examined these I find that Bryk has made the same observation about *P. apollo* var. *flavomaculata*, Deck., which he figures in his monograph (Taf., v., 80, and xi., 92). He also states that in the rare ab. *lamperti*, Bryk., in which the black part of the pattern is replaced by pale grey, the scales are deformed and very deficient in pigment (Taf., ix., 78). (Bryk., "Parnassius apollo," 1915, Berlin; reprinted from "Arch. f. Naturgeschichte," 1914, lxxx., Abt. A.)

Verity figures curled scales in the ground colour of *P. simo diaphana*, but does not mention them in the text ("Rhopalocera Palearctica," pl. ii.)

Thais polyxena, Schiff. Kedos, Asia Minor, 18.v.18.

Thais cerisyi, God., male, Yozgat, Asia Minor, vi.18, and another, Mosul, ii.19, the former species with pink and the latter with yellow replacing red on the wings and abdomen. The scales in the spots are curled up, those of the pale yellow ground colour are rolled up and very thin, and in the specimen of *polyxena* the blue scales are transparent and rolled up. (Brit. Mus.)

Thais polyxena f. *cassandra*. Two specimens with transparent areas replacing the ground colour, and with creamy spots. The scales in the transparent parts are devoid of pigment and very distorted; in the spots the scales are rolled up and the blue scales are shrivelled up like hairs (Hill Museum). These are very like ab. *vitrina*, Rothsch. ("Nov. Zool.," 1918, p. 73.)

Thais rumina ab. *alba*, with white ground colour and cream spots instead of red, of which both sexes are figured by Esper, is probably due to a similar scale defect. ("Europäische Schmetterlinge," 1829, vol. i., Taf. cv., cont. lx.)

T. rumina var. *nebulosa*, Holl., shows the complementary condition. All the black markings are replaced by pale grey, and the scales are very deficient in pigment, thin and rolled up to a point. The scales of the yellow ground, red spots, and the pale blue ones scattered in the black border are all normal. (Rothschild Coll.)

T. rumina ab. *meta*, Meig., with cream-coloured spots, shows no abnormality of the scales in the five which I have examined, and is probably a true colour variety, due to a difference in pigment. *Alba*, Esp., is generally regarded as a synonym, but the white ground colour is very different from that of *meta*.

Thais polyxena ab. *albina*. Standfuss figures a specimen in which all parts of the pattern are very pale, and probably all the scales are pathological. ("Handbuch Paläarkt. Gross. Schmett.," Taf. iv., fig. 14.)

Armandia thaidina, Blanch., three females. Mow-pin 10,000 feet. In the cream ground-colour the scales are rolled a little, the inner red band of the hindwing is replaced by pink, in which the scales are pale and rolled up. The blue, the black, and the red scales in the lunules are normal.

Sericinus greyi, Brem., two males. N. China. Ground colour very pale and semi-transparent on the forewings with transparent distorted scales. Red markings replaced by pink, in which the scales are rolled up.

Sericinus fasciatus, Brem., three males and a female. Shanghai. Semi-transparent ground, due to transparency and extreme distortion of the scales. Red markings replaced by pink and with rolled up scales. In one the blue scales are rolled up.

Doritis apollinus, Hbst., three males, Smyrna. Hindwings transparent instead of cream-coloured and opaque. Scales devoid of pigment, thin, and rolled up. In two, orange curled scales and in one yellow, rolled up ones replace the normal flat red ones in the spots. The blue and black scales are normal. These are all in the British Museum.

In the genus *Papilio* scale defects seem to be as rare as they are common in the other Papilionidæ.

P. machaon, L., with pure white ground colour. Scales thin, rolled up, and transparent. Black, red, and blue scales normal. (Bright Coll.)

PIERIDÆ.—*Euchloë cardamines*, L. A male with all the black parts of the pattern white. The scales are extremely thin, transparent, and rolled up to a point in the parts which ought to be black on the upper-side, and similar scales are scattered on the underside in the areas which are green normally but pale yellow in this specimen. The white and orange scales are unaltered (Webb Coll., now in the Bright Coll.). A male with pale buff replacing black shows diminution of pigment and a little curling of the edges of some scales. (Leech Coll., Germany, 1901.)

E. cardamines, L. Complementary form with the orange very pale and pinkish in colour. All the orange scales are thin, poorly pigmented and curled at the edges, the white scales are thinner and much more curled up (Elwes Coll.). In a similar but less extreme specimen from Petropolis, the orange and white scales are deficient in pigment, but they are much less curled up.

Hebomia glaucippe, L., Darjiling. A male with all the black on the upperside replaced by pale grey, and the dark brown of the underside by buff. The scales, in all four wings and on both surfaces, which ought to be black are thin, transparent, and rolled up to a point (Brit. Mus.). *H. bornensis*, Wall, Borneo. A male with scales rolled up and deficient in pigment. All the black markings replaced by very light brown (Hill Museum).

Delias aruna, Boisd., male. The normal male has a deep orange ground colour with black apices to the forewings, and a deep crimson base on the underside. Lord Rothschild has a specimen with cream-coloured ground and with the basal area pale pink. In these areas the scales are deficient in pigment and have curled edges. The black scales are normal.

NYMPHALIDÆ.—In the fritillaries aberrations with white or straw-colour replacing the usual tawny ground colour are well known, though

rare. An example in *Brenthis euphrosyne*, L., is figured by Mosley, and one of *B. selene*, Schiff., by Barrett, "Brit. Lepidopt.," vol. i., pl. xxvi. Specimens of *B. euphrosyne*, L., in the Banks and Bright collections, with a white ground colour, have all the scales of the upper layer devoid of pigment, very thin, and much rolled and twisted, those of the lower layer transparent but flat. The black scales are normal. Straw coloured specimens show similar changes, but not so extreme. Five examples of *B. selene*, Schiff., with white, or nearly white, ground in the Banks and Bright collections, and a *B. amathusia*, Esp., with white ground (Elwes Coll., Brit. Mus.), a *Melitaea athalia*, Esp., with white ground (Bright Coll.), all show the same condition.

Dryas paphia, L. Maidstone, 1860, from Webb Coll., with white ground, and another, 1913, with cream-coloured ground (Bright Coll.), show the same thin, transparent, curled and twisted upper scales with transparent flat under scales. *Argynnis cydippe*, L., with light yellowish ground colour, has many scales transparent, thin, and rolled up, others normal and others intermediate. (Male, New Forest, 1919. Bright Coll.)

An *Issoria lathonia*, L., with white ground colour figured ("Iris," 1905, xviii., Jaf. I.), and an *Argynnis aglaia*, L., with white ground colour, recorded from Halton, Bucks, by Goodson ("Entomologist," 1921, liv., p. 124), are no doubt similar pathological forms. In these specimens with a white ground colour the tawny scales on the abdomen are also replaced by white ones. Specimens of the complementary form, with the ground colour normal, or nearly normal, but with the black markings pale silver in colour, are very much rarer. *Argynnis aglaia*, L., var. *molybdina*, described by Newnham ("Ent. Record," 1917, p. 287, and "Ent.," 1917, l., pp. 207, 230), and a *Brenthis euphrosyne*, figured by Mosley, are examples.

I have examined two—an *Argynnis cydippe*, in Lord Rothschild's collection, and a *B. euphrosyne*, Barnwell Wold, 1864, in Mr. Bright's. In both of them the silvery scales are extremely thin, transparent, and rolled up to a point, but the tawny scales of the ground colour are normal. In the *Vanessas* both forms exist.

Aglais urticae, L., with white ground colour (Rothschild's Coll.). The scales are very thin, transparent, and curled up, but the wing membrane is not exposed. The black scales are normal. Specimens with cream-coloured ground in the Banks and Bright collections show similar, but less extreme, alteration.

Grapta c-album, L., Wye Valley. Two females and a male with the ground colour pale ochreous show deficiency of pigment. In the females some scales have curled edges, and in the male the curling is considerable. (Bright Coll.)

Pyrameis atalanta, L., with red replaced by pale cream colour, Gateshead ("Ent.," 1911, xlv., p. 368); *P. cardui*, L., with white ground colour, Boynton; *Grapta c-album*, L., with silvery white ground, Ganarew ("Ent.," 1922, lv., p. 92); and *Eugonia polychloros*

ab. *pallida*, Tutt, with white ground colour, must belong to this group.

Complementary to these are *Vanessa (Grapta) c-album*, L., with the black on the upper surface replaced by silvery grey, and with the under surface pale ochreous, figured by Herrich-Schäffer ("Europäische Schmett.," 1848, vol. i., Taf. 85, figs. 159 and 160), and *Pyrameis atalanta*, L., from Berlin. Leech Coll., British Museum. This has all the black markings of the wings, thorax, and abdomen replaced by pale grey, but has the white and red areas normal. The upper scales in the grey part are all deficient in pigment, and rolled up to a point, exposing the flat under scales, in which the pigment is defective also. The change is greatest in the black dots in the red border of the hindwings. Owing to the even arrangement of the scales in this species the appearance under the microscope is very striking. The white, red, and pale blue scales are all normal.

Phyciodes tharos, Drwy. Black replaced by pale grey in a female figured by Edwards. ("Butterflies of North America," 1884, ii., pl. ii., fig. 18.)

Euvanessa antiopa, L. In specimens with a white or whitish border and costal markings the upper scales are deficient in or devoid of pigment, and rolled up. In extreme cases they are so thin and tightly rolled as to resemble hairs, and the under scales may be curled up at the edges. The blue scales may be curled or rolled up too. Out of 56 British specimens 47 had pale borders with defective scales, and ten had defective blue scales as well. The defect was found in specimens from Lapland, Switzerland, Alaska, California, and Central Asia. It seems to be common near the northern limit of its range and at high altitudes. ("Ent. Record," xxxiii., 1921, pp. 205-210.)

Vanessa io, L. Silver in colour round the ocellus and apical dots, and with a silver border; black costal markings dark grey. Ground colour normal, and posterior half of border in each hindwing unaffected. In the silver parts the scales are exceedingly thin, rolled up, and without pigment. Those in the black costal markings are less thin, have some pigment, and are less rolled up. (Caught 1854. Harper Coll.) Specimens from the Webb collection with symmetrical silvery appearance in part of the border of the forewings, show a similar defect.

SATYRIÆ.—The form of *Epinephele tithonus*, L., with a white ground colour is figured by Barrett ("Brit. Lepidopt.," vol. i., pl. xxxiv.). Eight with ground colour varying from white to chrome yellow were taken in 1900 on Portsdown Hill, by G. M. Russell, and are figured ("Ent.," 1904, xxxvii., p. 125). Those with white ground colour, ab. *albida*, Russell, show extreme thinness and rolling up of the upper scales with absence of pigment, those with cream-coloured ground, ab. *subalbida*, Verity, and with chrome yellow ground, ab. *mincki*, Seebom., show similar but less extreme alteration. I have examined Russell's specimens now in the British Museum, and one ab. *albida* in the Bright Collection. The complementary form with the black part cream-coloured and the ground colour unaltered, is known.

In *Epinephele jurtina*, L., a form with white ground colour is found,

ab. pallens, Mieg. One is figured by Oudemans ("Tijdschr. v. Ent.," 1905, xlviii.), and another by Barrett ("Brit. Lepidopt.," vol. i., pl. xxxiii.). In a male in Mr. H. B. Williams' Collection, in two females in Lord Rothschild's, and two in Mr. Bright's, the lower scales are flat but devoid of pigment, those of the upper layer are very thin, unpigmented, and rolled up. The scales on the dark brown part of the wing and ocellus are normal.

The complementary form, *ab. brigitta*, Ljungh., in which the tawny ground colour is normal, the black part of the ocellus replaced by pale grey, and the dark brown part of the pattern altered to white or cream colour is very much rarer. A white one is figured by Esper ("Europäische Schmett.," vol. i., Taf. lxxxii., cont. xxxii.). A female in Mr. R. W. Robbins' possession, and another in Mr. Bright's, have the scales of the ocellus poorly pigmented and rolled up, the upper scales of the creamy part thin, transparent and rolled up, the lower scales transparent but flat, and the tawny scales normal. Males and females with the whole of the wing pale have a general deficiency of pigment, with curling of some scales in all parts of the pattern.

Satyrus semele, L., with white ground colour has the upper layer of scales thin, transparent, and rolled up, the lower layer transparent but flat (Bright Coll.).

Satyrus arethusa, Esp., *ab. albina*, Oberth., with the deep brown replaced by pale yellowish grey is probably a complementary form ("Études. Ent.," 1896, xx., pl. ii., fig. 11).

Pararge megara, L., with silvery white ground colour. Scales excessively thin, rolled up so as to resemble coarse hairs, and unpigmented. Scales of dark part normal. (Somerset. Bright Coll.)

P. megara ab. pallescens, Oberth., and *P. hiera ab. pallescens*, Oberth., with the black parts pale cream or greyish, are figured in the "Études. Lep. Comp.," 1912, vi., pl. cxxiv.

P. ageria ab. albescent, Oberth., with black replaced by buff, shows great deficiency of pigment, but few scales are curled. (Bright Coll.) These are complementary forms.

In *Erebia* both forms of scale defect seem to be rare.

E. epiphron ab. albinescent, Oberth., male and female with red-brown replaced by cream or palest chestnut, black part normal. ("Études. Lep. Comp.," 1911, v., pt. i., pl. lxxiii., figs. 667 and 672.)

E. tyndarus ab. albana, Oberth., has the red-brown markings on both surfaces replaced by white. ("Ét. Lep. Comp.," 1912, pl. cxxiii., fig. 1904.) *E. medusa* pure white replacing red-brown. ("Ent. Zeitschr. Guben.," 1894, viii., p. 134.)

The complementary forms with the black replaced by cream or pale grey are described and figured by Oberthür.

E. lappona ab. albina ("Ét. Lep. Comp.," 1911, v., pl. lxxiii., fig. 671), *E. athiops ab. huebneri*, *E. euryale ab. huebneri*, and *E. ligea ab. huebneri* ("Ét. Lep. Comp.," 1912, vi., pl. cxxiv.).

Eneis scudla, Ev. Two females with white ground colour instead of buff. Upper scales curled at the edges. (Hill Museum.)

In *Cænonympha pamphilus*, L., deficiency of pigment appears to take place with little reduction in thickness of the scales. Only the whitest specimens from Royston, in Mr. Williams' Collection, and similar ones in the Bright and Doubleday Coll., show any curling of the scales. A corresponding form, *C. arcanus* ab. *dupuyi*, Oberth., is figured in the "Études.," 1910, iv., pl. xxxvii.

Melanargia galatea, L., with black replaced by buff, Monk's Wood, has deficient pigment but no deformed scales. Two similar specimens from Worcester have many scales curled both in the white ground colour and in the buff part. (Bright Coll.)

ERYCINIDÆ.—*Nemeobius lucina*, L., male. Chilterns, Bright Coll. With creamy ground colour has many scales deficient in, or devoid of, pigment and curled or rolled up. All the black scales are normal. Lord Rothschild has the complementary form with the black part of the pattern replaced by pale grey, and in this these scales are poorly pigmented and rolled up, but the others are normal.

LYCÆNIDÆ.—In *Chrysophanus* and its close allies, the colour is, according to Onslow, due to an orange pigment, and the brilliant metallic lustre is caused by the highly polished surface of the scale.

Rumicia phlaeas ab. *alba*, Tutt, with a white ground colour is not very uncommon. I have examined about a dozen, all of which have flat, transparent under scales, and thin transparent rolled up upper scales. The scales in the black part of the pattern are normal. The ab. *schmidtii*, Gerh., is very similar, but some of the scales have a little pigment in them.

In ab. *intermedia*, Tutt, some of the scales are almost normally pigmented and quite flat, others deficient in pigment and curled or rolled up.

The complementary forms are extremely rare.

The ab. *hübneri*, Tutt, named from a specimen taken near Berlin, figured by Hübner, has the black parts white, the copper parts normal. The ab. *webbi*, Tutt, taken at Reigate, figured by Mosley and Barrett, has the black spots pale grey, and the black border replaced by cream colour. Mr. Bright allowed me to examine it, and I found the lower layer of scales thin, partially transparent and curled, and the upper layer exceedingly thin, transparent and rolled up to a fine point. Those in the spots are thin and rolled up, but have some pigment. A specimen from Dover with black replaced by grey merely shows deficiency of pigment.

Oberthür describes and figures *Chrysophanus gordius* ab. *albescens*, male, Grisons, *C. virgaurea* ab. *virginalis*, male, Silesia, with white ground colour. *C. chryseis* ab. *hermation*, male, Silesia, corresponding in colour to *R. phlaeas* ab. *schmidtii* and *C. virgaurea* ab. *chryzon*, with pale yellow ground, male, Frankfort-on-Maine, in his "Études.," 1910, iv. The last appears to be very like ab. *onka*, Fruhst. He also says that he believes there is an aberration of *C. virgaurea* in which the copper remains normal, but the black border and spots become white ("Bull. Soc. Ent. France," 1905, p. 56).

In the "Blues" the arrangement of the scales makes similar scale

defects present a different appearance. On the upperside there are three different sets of scales in the pattern, which may be affected independently: the upper scales, which are blue owing to their physical structure, the under scales which are deep brown or black, and the orange scales of the lunules. I described and figured the pathological scales of the upper layer, which become transparent, thin, and rolled up, allowing the black of the under layer to be seen through and between them, giving them a leaden colour. ("Trans. Ent. Soc. Lond.," 1917, p. 165.)

I have examined twenty more or less leaden-coloured males of *Agriades thetis* in the British Museum and Bright Collection, and two females taken by Dr. Nash in May, 1921, at Wye, which have leaden instead of blue markings. I have looked at eighteen males of *A. coridon* under the microscope, specimens from various British localities and one from Holland (Godman-Salvin Coll.), two leaden females ab. *syngrapha* from the Chilterns, and a dull leaden female ab. *semisyngrapha*, Tutt, taken by Dr. Nash at Royston, in 1917. All these show the same defect, rolling up and transparency of the upper scales. I have also examined a specimen of *A. thetis*, with the forewings leaden and the hindwings normal, and one with all the wings leaden except for a bright blue border of uniform width, and several partly leaden partly blue. These had the upper scales in the leaden areas similarly defective. In the general collection of the British Museum there are examples of the following species with the same abnormality of the upper layer of scales.

Polyommatus hylas, Esp., male. N. Spain. Wrongly labelled ab. *nivescens*, Kefers. The scales in *nivescens* are flat and of normal thickness, and the insect is brighter and whiter than this pale leaden one. *Hirsutina dolus*, Boisd. A male, more lilac-coloured than usual. S. France. (Godman-Salvin Coll.) *Polyommatus mesopotamica*, Staud. Two extreme leaden forms, Malatia (Leech Coll.), and one less marked example, Malatia (Godman-Salvin Coll.). *Polyommatus pylaon*, F. de W., male, Steppes, S.E. Russia (Zell. Coll.). *Ereres polysperchon*, Berg. Several males and females, a male of *E. argiades*, Pall., and several *E. coreias*, Ochs. *Cyaniris argiolus* var. *hugelii*, Moore, male, Kobe, Japan. (Scarlett, 28.vi.1900.) *C. argiolus* var. *lucia*, Kirby, female, Nebraska. (Crowley Bequest.) *Argiolaus lalos*, Druce, male. A leaden colour replaces the deep metallic blue. Upper scales thin, transparent, and in many cases rolled to a point. Lower scales and scales of orange anal spots normal. In the females of *A. thetis* and *A. coridon* the scales of the orange lunules are normal, and in all species the underside is unaffected.

Mr. Bethune-Baker showed a number of examples of *Agriades thetis*, *A. coridon*, *A. escheri*, *Polyommatus hylas*, *P. icarus*, *Plebeius argus*, L., and *Cyaniris argiolus* at the Entomological Society of London, in March, 1921, and stated that the leaden colour was due to the same defect. He said that throughout Provence, where they were taken in 1920, a fine sunny year, 15% to 20% of all the blues were

leaden. All the *hylas*, about a dozen of which were seen, were of this colour.

The complementary form, in which the under scales are pathological, has a pale semitransparent appearance in the blue part of the wing in the males, and, when the pigment is entirely absent, there is a pale grey border with a slight bluish iridescence. There are two males of *A. coridon* like this in the Bright Collection, both taken at Royston, in 1920. They show transparency and curling of the scales of the lower layer and border, but the blue scales and androconia are normal. A third specimen is similar, but some of the blue scales are curled at the edges. When the change is less complete and some pigment is present, the border is a pale khaki colour, and a tinge of this shows in the blue part.

I have examined males of this form in the Bright Collection from Dover and Royston, and one continental specimen from the Feisthamel Collection (Hill Museum).

In the female the absence or scarcity of blue scales allows the khaki colour to show all over the wings in specimens with some pigment, and in those with little or none there is a pale grey colour with a bluish iridescence, but the scales are not rolled up to a point.

I examined the following females:—*A. coridon*, khaki colour; few scales curled; two with bluish iridescence; most of the scales curled. *A. thetis*, pale khaki, orange lunules normal. Scales very thin and many curled up. Many normal blue scales present. Torquay, 1842. *A. thetis*, two pale greyish brown females with deep orange lunules. Curled scales fewer in number. Normal blue scales present. Folkestone, 1887. *Plebeius argus*, L., female. Khaki-coloured with bluish iridescence. Scales very thin, transparent, and curled at edges. New Forest. *Cupido minimus*, Fuessl., khaki male. Pigment very deficient, some scales curled. Blue scales normal. (Bright Collection except one *Coridon* female, Williams Coll.) * *Cupido persephatta*, Alpheraky. A very pale buff-coloured female with thin transparent scales rolled up to a point, or curled at the edges. (Brit. Mus.)

In the leaden ab. *syngrapha*, and in khaki females of *coridon* and *thetis*, the scales in the orange lunules are normal. *Lycenidae* with defect of the upper scales, are much commoner than those with defect of the under scales.

Specimens with pathological scales in the lunules appear to be rarer than either of the two other groups. *Aricia medon*, Hufn., female with white lunules on all four wings. The scales of lunules show extreme thinness and transparency, and are rolled up to a point. At the edges of the lunules single normal blue scales were seen and the dark brown scales were all normal. (Newman, Folkestone, 1920, Bright Coll.) Wright records this aberration of *medon* and says it is var. *graaft*, ver Huell, three or four of which have been taken in Holland. ("Ent.," 1922, lv., p. 111.) *Plebeius argus*, L. Three females with white lunules. One from Dover shows extreme alteration of these scales in all four wings, the other from North Kent shows less alteration of the scales in the lunules

of the forewings (Bright Coll.). The third is a gynandromorphous specimen with the wings on one side small and liberally sprinkled with blue scales, which, like the dark brown ones, are unaltered.

From this account it will be seen that any one of the three sets of scales may show these pathological changes without any abnormality occurring in the two other sets. The androconia are unaffected both in leaden and khaki blues.

GRYOCERA.—*Nisioinades tages*, L. Bucks, Chilterns, 1918. Pale grey specimen with upper scales very thin and curled or rolled up. (Bright Coll.) *Adopaea linea*, two males with silvery-white ground colour, in which the scales are extremely thin, transparent, and curled or rolled up. Scales of sex brand and black border normal. This is the ab. *ardens*, Esper. A similar form of *A. lineola* ab. *ardens*, Oberth., is figured in the "Études," 1910, iv., pl. xxxvii., and it is known in *Augiades (Erynnis) comma*, L. Cruikshank has taken an *Augiades sylvanus*, Esp., in Hampshire with all the tawny colour of the wings and abdomen replaced by white. ("Ent. Rec.," 1922, xxxiv., p. 16.) The complementary forms which retain the tawny ground colour, but have the sex brand and border replaced by pale greyish ochreous are *A. linea* ab. *antiardens*, Oberth., and *A. comma* ab. *albescens*, Oberth., figured on the same plate. The latter aberration is also figured by Barrett and Mosley. Mr. Bright has a specimen of *A. comma*, a female, with the black part of the pattern silvery-grey, and here the scales are very thin, transparent, and rolled to a point, those in the tawny part are all well pigmented, but a few are a little rolled up at the tip. According to Oberthür all the species of *Syrichthus* may have black replaced by pale grey, and he figures an example in *S. malvae*, L., under the name ab. *albina*, on the same plate as the aberrations discussed above.

HETEROCERA.—*Triphaena jimbria*, L. Two specimens with the orange of the abdomen and hindwings replaced by white, the black band of the hindwings and the colours of the forewings remaining normal. The hindwings in this species are very hairy, but where the scales are visible they are seen to be very thin, transparent, and rolled up. (Folkestone, Bankes Coll. and Rothschild Coll.)

T. pronuba, L. Holland, Swansea, Bankes Coll. The specimen is figured in Barrett's "Brit. Lepidopt.," vol. iv., pl. 140. It looks as if sprinkled with grey powder. The black bands on the hindwings are pale grey, and the scales are very thin, rolled up, and transparent. Over the rest of the insect there is some deficiency in pigment and curling of the edges of the scales. A similar specimen was bred from a pupa found at Tarvin by Mr. Gordon Smith, who tells me that many of the scales were defective. ("Records and Observations of British Lepidoptera," S. Gordon Smith and E. Nevill Wilmer, Chester, 1922, p. 25.)

T. comes, Hubn., Dover. Bankes Coll. The insect is almost uniformly cream-coloured. The scales are all very deficient in pigment, and many are curled up.

Taeniocampa gracilis, Fab. Hon. N. C. Rothschild, Wood Walton Fen, Hunts, April, 1918. Several pure white specimens were captured, of which a pair are in the British Museum. All the scales of both fore- and hindwings are transparent, some are flat, others curled or rolled up.

Manestra brassicae, L. C. Nicholson, captured at sugar, Clapton. The markings are almost absent and the wings have a glossy appearance. Many scales are transparent and some curled inwards at the edges.

Probably the very pale specimens of *Noctua angur* and *Taeniocampa siabilis*, View., figured by Barrett, vol. iv., pl. 141, and vol. v., pl. 209. are similar pathological forms.

Catocala nupta, L. Oudemans gives a coloured plate of a specimen with the black band on the hindwings replaced by pale grey, and figures the rolled up scales. ("Tijdschr. v. Ent.," 1896, xxxix., p. 167.)

Zygaena trifolii, Esp. Red on all four wings replaced by white. Scales thin and rolled up. T. H. Grosvenor, Sussex, 1921.

Callimorpha dominula, L., with the red colour of the hindwings and abdomen replaced by pure white, the rest of the pattern remaining unaltered. These scales are devoid of pigment, thin, and rolled up. (Rothschild Coll.)

Callimorpha quadripunctaria. Germany. Bed of hindwings and abdomen replaced by white, due to a similar but less extreme scale defect. (Joicey Coll.)

Cosmotriche potatoria, L., female (Rothschild Coll.), *Dasychira fascelina*, L. (Bankes Coll.). White forms with transparent scales, which are very narrow, and in consequence show with little curling.

Opisthograptis luteolata, L. White aberration (British Museum). Scales unpigmented and non-fluorescent. Comparatively few are curled.

Standfuss states that two albinistic larvae, one of *Arctia caia*, the other of *Dendrolimus pini*, gave albino imagines, the rest, which were of normal colour, gave normal imagines. ("Handbuch Palaarkt. Gron. Schmiett," p. 201.)

We know nothing about the cause of these defects, which even in the same species may in one specimen affect one part of the pattern and in another may affect another part. If the same agency is at work in all cases, it is difficult to understand how this can happen, unless the development of the scales in one part of the pattern takes place at a slightly different period from that of the scales in another. There is no evidence that it is dependent on climate. Specimens come from the arctic and the tropics, from sea level and high altitudes.

They are commoner in some years than in others, and in some localities than in others. At Royston, for instance, several *Coenonympha pamphilus* ab. *pallida* were taken, and leaden and khaki forms of *Agriades coridon* occurred in greater numbers than usual in 1920, a cool damp year. Whereas in the same year leaden blues were quite common in Provence, where the season was very dry and sunny. Leaden *A. thetis* seem to be commoner at Folkestone and Swanage than

elsewhere, and at the latter place Mr. Worsley-Wood tells me he took twenty in one year without much trouble.

Many of these aberrations have been taken in the Chilterns. A number in Mr. Bright's collection come from this locality, and Goodson records a number from the neighbourhood of Tring in the "Entomologist," 1921.

Allen reports the capture of four of the rare white form of *Brenthis selene* in one day, in Wyre Forest ("Ent. Rec.," 1916, xxviii., p. 16). The only species in which defective specimens are commoner than normal ones is *Euvanessa antiopa* from Arctic Europe and America. Apparently five out of every six are defective towards the northern limit of its range. One is inclined to put this down to the more rigorous climate, but heat and cold experiments have not produced it, although it is a species which has been used frequently.

If bacteria or some other infective agent is the cause, we should expect it to be commoner in bred specimens; but nearly all the specimens are captured and are full-sized, and perfect in every other respect. Mr. Richards bred a *Rumicia phlaeas* ab. *alba* with several hundred normal specimens, and tells me the larvæ were very free from disease. In 1919 I bred some *Pararge megera* from the egg, in a warm room in a closed tin. One which failed to emerge had a pure white ground colour. The temperature was equable and the box was always moist, but the grass was kept sometimes until it had begun to turn yellow. There seems to be no common factor which causes the defect. It is possible that the condition is hereditary, and comparable to hereditary defects of the epidermis found in birds and mammals, including man. It is due to some general condition acting from within or from without. The areas affected on the two surfaces of the wing are frequently different, a sharp contrast with local defects in which they always coincide, and thoracic and abdominal scales are often defective, as well as those on the wings.

A scale defect, which differs from the one just mentioned, affects the ground colour, sparing the black markings. It is particularly common in *Vanessidae*, especially in *V. io*. Most of the scales have the distal half, or two-thirds, twisted into a tight spiral, so that they resemble coarse hairs. In some scales the spiral is less tight, in others the distal half is merely bent over. In the most marked examples the scales appear to be reduced in number, and both upper and under scales are altered, so that the wing membrane is visible. Pigment is always present, but is sometimes duller and more violet than usual. It may be diminished in amount, and the scale may be unduly thin, especially in the distal part. The scales may stand upright or have the distal part upturned.

In *Vanessa io*, L., this abnormality gives the insect a dull violet tint and a semitransparent or greasy appearance. In some specimens the base of the wing is very nearly normal. In *Aglais urticae*, L., the cream markings near the costa are less altered than the fulvous part, which is a dull violet colour.

In *Pyrameis atalanta*, L., the red colour appears dull and semi-

transparent, and in *Grapta c-album*, L., the colour is dull violet. This condition in *A. urticae*, with upturned, pigmented, hair-like scales, showing the wing membrane between, affords a striking contrast with the white variety of the same insect, with all the scales transparent and devoid of pigment, but without any exposed wing membrane.

In *P. atalanta* the scales of the white dot, which lies in the red band of the forewings, are normal, and show up conspicuously amongst the tightly twisted red ones.

I have examined four *P. atalanta* (Bright Coll.), six *V. io*, six *A. urticae*, and one *Grapta c-album* (Miss Vivian, Shropshire), with this defect.

Almost all similar specimens are bred, and it is possible overcrowding of the larvæ in closed boxes may be the cause. It is stated that a number of *V. io* were bred with scales replaced by short red hairs, giving the wings a glazed appearance. The larvæ were crowded together and perspired much. ("Ent.," 1878, p. 186.)

Apart from the *Vanessidae* I have seen this defect in *Papilio machaon*, with the ground colour dull brown and semitransparent. The scales were upturned, twisted into tight spirals, and the membrane was exposed. (Bright Coll. Figured in Mosley's Illustrations.)

I have also seen it in *Erebia aethiops*, Esp. Three males taken in Dumbartonshire, in 1921, had the red-brown replaced by dull violaceous colour, and these parts of the wings were semitransparent. The lower layer of scales on both surfaces in these areas were abnormally coloured, and some were curled at the edges. The upper scales were nearly all twisted into spirals, most of them so tightly as to resemble hairs in the distal half, others more loosely. Some were merely turned over so that the distal part had its lower surface uppermost. The black scales and the white scales of the ocelli and of the under surface of the hindwing were normal. Every scale which is usually red-brown on all four wings, and on both surfaces, was abnormal, but no wing membrane was visible.

A similar aberration of *Erebia ligea* ab. *livida*, Oberth., male, is figured ("Études. Lep. Comp.," 1912, vi., pl. cxxiv., fig. 1098) and described (ibid, 1909, iii., p. 381) as "brun pâle livide," and on page 829 an aberration of *E. euryale*, Esp., of the same colour is mentioned.

Mr. H. Worsley-Wood tells me there is a similar aberration of *E. aethiops* in the Massey collection, with spirally rolled scales. It was taken by Reid, at Forres, in 1884.

A similar *Erebia aethiops*, Esp., is figured by Ernst. ("Papillons de l'Europe," 1779, vol. ii., pl. lxx., fig. 43h).

Two specimens of *E. ligea*, L., with the rusty band and spots replaced by violet grey, were taken at Bjorkliden, Lapland. (Rosa, "Ent.," 1921, liv., p. 281.)

UNCLASSIFIED SCALE DEFECTS.

A *Vanessa io*, L., with a yellow-brown ground colour, dusted with silver, shows a general deficiency of pigment. The silver dusting is produced by scales which are turned out sharply at the middle, so that

their undersides lie uppermost and reflect the light. The ends of these scales lie quite flat and show the striae clearly. (Bright Coll.)

Colias rautieri, Guér., Coquimbo, male. The underside, costæ, posterior borders, and nervures on the upperside of all four wings, have normal scales. The rest of the upperside has, on the forewings, a pinkish scaleless appearance, and on the hindwings a creamy colour, instead of the usual deep orange. The upper scales in the abnormal part all have their edges tightly rolled over, and look like thick hairs. Many of those in the forewing are fully pigmented, those in the hindwing are deficient or lacking in pigment altogether. The under scales are very pale, but not deformed. (Adams Coll.)

Pieris brassicae, L., with white ground colour brownish. The scales are set vertically, and bent and twisted in all directions. They appear white under the microscope (Bright Coll.). Lord Rothschild has a much darker specimen with a similar scale defect. The black parts appear to be unaltered.

Arctia caia, L., Germany. The scales of the white part of the pattern are all arranged in an abnormal manner. Many are set vertically, others sideways, and the scales themselves are bent and twisted in all directions. They contrast sharply with the brown scales, which are all arranged in an orderly way, though tilted upwards a little more than usual. Much wing membrane is exposed in the white areas, none in the brown. The red scales in the hindwings are a little deficient in pigment, and the edges are slightly curled up, but the general arrangement is regular. (Leech Coll.)

Abraaxas sylvata, Sc., pale brownish subdiaphanous. All the scales are narrow, too few in number, and curled in various ways. (J. Maddison, Durham.)

Cyaniris argioides, L., female, with general colour pale and with black tips. Khaki coloured. Deficiency of black pigment. Many blue scales much curled at edges.

Automeris gayi, Lucas, Chili. Underside normal. Deep metallic blue of upperside replaced by shining steel-grey. All the scales seem to be bent sharply upwards, so that the extremities point vertically upwards. Under the microscope the tips look like rows of tiny silver beads. (Joicey Coll.)

ABNORMAL SCALES WITH ABNORMAL PIGMENT.

Argynnis cydippe, L., male. Dusky ground colour. Many scales partly transparent. The pigment in the others must be abnormally dark.

Argynnis aglaia, L., N. Cornwall. Dusky ground colour. Some scales are deficient in pigment and curled up. The pigment present must be abnormal.

Limnas chrysippus var. *inaria*, Mombasa, 13.vi.1888. Dull brown instead of chesnut. Scales curled here and there all over the wings. A specimen with white hindwings, Old Calabar, 1901. Chesnut altered to a dull brown. Scales in the anterior part of the forewings all transparent, curled up and twisted, some bent over on the rest of

the surface. Another similar specimen has the defect of scales less pronounced, but the colour is the same. (British Museum.)

Catocala nupta, L. Red of hindwings replaced by deep brown with a violet iridescence. The scales are deeply pigmented, and many have the tips turned upwards and transparent. This gives the violet iridescence, which is not at all comparable to that of *C. fraxini*. In the normal hindwing all the scales are red, and there are no dark under scales.

Callimorpha dominula, L. I have a typical specimen and two var. *rossica* with a brown patch in the centre of each hindwing. These scales are full of dark abnormal pigment, their ends are upturned and rolled up.

I have been unable to examine the form of *Arctia villica* with dark brown hindwings.

IMPERFECT EXPANSION OF WINGS.

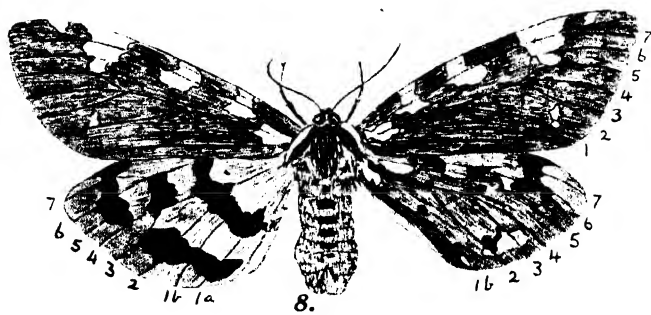
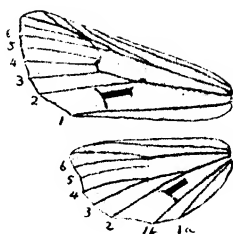
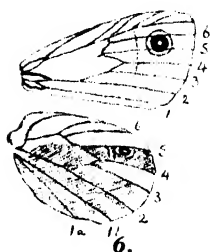
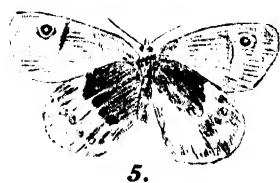
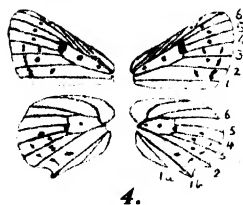
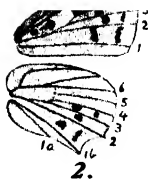
Crippling, as it is commonly called, is to a great extent due to unfavourable external conditions. Unduly dry atmosphere seems to be the chief cause, and explains why it is common in captivity. The *Hybernias* are especially liable to emerge and develop imperfectly in captivity, and *Aglia tau*, according to Lord Rothschild, is a species difficult to breed perfect. In these remarks I am taking for granted that the insect is able to climb to a suitable position to expand its wings. Weakness of the insect itself also plays a part.

From a pupa of *Arctia caia* a crippled imago and an ichneumon fly emerged. ("Ent. Month. Mag.," 1852, p. 73.) Many extreme aberrations are particularly liable to crippling both in captivity and under natural conditions. Black aberrations of *Arctia caia* and *Callimorpha dominula* may be cited as examples. Many of these aberrations are probably pathological.

The best evidence on this point is afforded by *Abraxas sylvata*. This species was very common near York one year, and there were many leaden forms and some asymmetrical. Most of these were crippled, and some lacked hindwings. ("Proc. Ent. Soc. Lond.," 1897, p. xlix.) Tutt discusses the question and thinks that they are pathological. He points out that in most years they are rare, but on this occasion were very common. ("Ent. Record," 1897, ix., pp. 805-807.)

Abraxas sylvata leaden forms were perfect, but the number of crippled intermediates was astonishing, chiefly on the left side. (Walker, "Ent. Record," 1899, xi., p. 24.) The scales in the leaden form are perfect, and the defect appears to be pigmentary. Probably it is not hereditary, and certainly it is not a Mendelian dominant like most melanic geometers. Ova from the leaden form gave nothing but typical specimens. ("Ent. Record," 1901, xiii., p. 297.)

Hygrochroa syringaria. Buckstone bred a number all with narrow or shortened wings, and some crippled as well. The male parent was normal, but the female was crippled. He considers that their front



legs were weak, which would account for the crippling of some of them. ("Proc. South Lond. N. H. Soc.," 1918-1919, p. 104.)

Homœosis. Mr. Worsley-Wood tells me he has bred a *Brephos parthenias* with a stripe of the orange of the upperside of the hindwing on the upperside of the forewing. (Wimbledon, 1922.)

Macaria notata with repetition of the compound spot of the forewings upon the hind. Purdey, Folkestone. (Barrett, "Brit. Lepidopt.," vi., p. 375.)

These appear to be the only examples of homœosis in Geometridæ.

Segmental defect. *Himera pennaria* with one antenna inserted above the eye and the other below the eye. (Pierret, "Bull. de la Soc. Ent. de France, 1847," ser. 2, v., p. lxxxv.). This was probably displaced by injury like the more remarkable example in the Homopteron, *Carineta formosa*, Germ., which had a full-sized leg on its head and a foreleg missing from the thorax. ("Ent. Zeitung. Wien," 1906, xxv., pp. 261-262.)

Hypertrophy. *Agrotis exclamationis* with very long claw to the left hind leg. ("Proc. South Lond. Ent. and N.H. Soc.," 1909, p. 112.)

EXPLANATION OF PLATE I.

Examples of Homœosis.

- Fig. 1. *Rumicia phleas* with patch of underside pattern of forewing on underside of left hindwing.
- Fig. 2. Same specimen showing relation of spots to nervures.
- Fig. 3. *R. phleas* with underside pattern of forewings on underside of both hindwings.
- Fig. 4. Same specimen showing the homology of the spots in the abnormal hindwings to those in the forewings.
- Fig. 5. *Cænonympha pamphilus* with underside pattern of forewing on underside of left hindwing. A. W. Mera.
- Fig. 6. Same specimen showing relation of pattern to nervures.
- Fig. 7. *Tæniocampa gothica* showing that the forewing marking on the upperside of the left hindwing bears the same relation to nervures as the normal upperside marking of the forewing.
- Fig. 8. *Pericallia matronula* showing the relation of the abnormal forewing markings on the right hindwing to the nervures.

REPORT ON THE BIRDS OF EPPING FOREST FOR THE YEAR 1921.

The Sixth Annual Report is appended hereto. The number of records received has been well maintained, but it is unfortunate that certain districts still remain largely unrecorded; Wanstead Park and Flats, Leyton Flats, Walthamstow and Woodford Forests, Lords Bushes and the Lower Forest having received little or no attention. Records from these districts are badly needed. The total number of species recorded is now 96; the four following species having been added during the year, *viz.*, Little Owl, White Wagtail, Grasshopper Warbler and Curlew. We continue to receive valuable help from several non-members of the Society and we would especially thank Mr. V. G. Davey of Loughton for important additions to our Forest records. As before, all records should be sent to the Secretary of the Section, Mr. S. Austin, 48, Darenth Road, Stamford Hill, N. 16.

CARRION CROW (*Corvus corone*).—Well distributed over Forest. A number of nests seen.

JACKDAW (*Corvus monedula*).—Frequently recorded. Nested at Golding's Hill (June) and Warren Hill (July).

ROOK (*Corvus frugilegus*).—Seen throughout the year on open spaces. A favourite roosting place is near King's Oak, High Beach. Mr. F. F. McKenzie, Forest Superintendent, reports as follows on the Wanstead Park Rookery for 1921:—"Although the Park is full of these birds during winter and spring, very few nests have been built recently, not more than a score this year. This may be the result of precautions taken against their nesting in the Heronry."

BRITISH JAY (*Garrulus glandarius rufitergum*).—Appears to be more common. Several nests found.

STARLING (*Sturnus vulgaris*).—Recorded commonly throughout year. Flocks of about 100 birds seen June 11th.

GREENFINCH (*Chloris chloris*).—Commonly recorded except during the nesting period. Young birds being fed at Loughton, September 7th.

HAWFINCH (*Coccothraustes coccothraustes*).—Numerous records throughout year. Three nests, Warren Hill, third week April; seen feeding on fruit of service tree during September.

BRITISH GOLDFINCH (*Carduelis carduelis britannica*).—Flock near the Warren, January 16th; Staple's Hill, December 18th.

HOUSE SPARROW (*Passer domesticus*).—Recorded from suitable places.

TREE SPARROW (*Passer montanus*).—Gilwell Lane, two, April 8rd; Chingford Wood, April 8rd and 9th; Warren Hill, July 17th and 24th.

CHAFFINCH (*Fringilla coelebs*).—In good numbers. Many nests found.

BRAMBLING (*Fringilla montifringilla*).—April 20th, small flock of about 17 seen in the birch woods behind High Beach Church, some in

beautiful (almost summer) plumage. Probably the prevailing east winds were responsible for keeping them back till so late a date.

LINNET (*Acanthis cannabina*).—Chingford Plain, April 3rd; Gilwell Lane, April 23rd; Theydon Bois, July 3rd. April-June five nests found, three in Paul's Nursery and two on Warren Hill (all young reared).

LESSER REDPOLL (*Acanthis linaria cabaret*).—Frequently recorded out of the breeding season. Flock of over 200 seen near High Beach Church, April 20th. Unfinished nest found at Loughton; both birds watched, close up, with field glasses.

BRITISH BULLFINCH (*Pyrrhula pyrrhula pileata*).—Recorded throughout year. Several nests found on Warren and Ludgate Plains.

YELLOW HAMMER (*Emberiza citrinella*).—Recorded from March to July. Nest found on Warren Plain, early July.

REED BUNTING (*Emberiza schoeniclus*).—Great Monk Wood, small flock, January 2nd; February 20th; small flock, February 27th; Fairmead Bottom, February 27th and October 16th.

SKYLARK (*Alauda arvensis*).—Well recorded. Nest found, Warren Plain.

WHITE WAGTAIL (*Motacilla alba*).—One, or more, seen in a flock of Pied Wagtails on Chingford Plain, September 4th.

PIED WAGTAIL (*Motacilla lugubris*).—Recorded from Chingford Plain, Connaught Water, Hatch Plain, Honey Lane Quarters, Strawberry and Warren Hills. Nest found in trees, Warren Hill, early June, has nested here for many years.

GREY WAGTAIL (*Motacilla boarula*).—One seen in the grounds of Bancroft's School, Woodford Green, on October 31st. One seen on Hatch Plain, on December 16th and 25th.

TREE PIPIT (*Anthus trivialis*).—Common and singing well. Nest found near Strawberry Hill—young flew middle of July. First seen, April 2nd, Hawk Wood. Last seen, September 2nd, Fairmead.

BRITISH TREE CREEPER (*Certhia familiaris britannica*).—Common. Nest found with young, second week July, Warren Hill.

NUTHATCH (*Sitta caesia*).—Recorded throughout the year. Two nests found, with young, in July.

GOLDCREST (*Regulus regulus*).—Normal status maintained. Nest found, near Warren Plain, first week in July.

BRITISH GREAT TITMOUSE (*Parus major newtoni*).—Recorded from all parts throughout year—nests found in many places.

BRITISH COAL TITMOUSE (*Parus ater britannicus*).—Well recorded—many nests found.

BRITISH MARSH TITMOUSE (*Parus palustris dresseri*).—Well recorded.

BRITISH BLUE TITMOUSE (*Parus caeruleus obscurus*).—Very commonly observed—several nests found.

BRITISH LONG-TAILED TITMOUSE (*Egithalus caudatus roseus*).—Numbers about as usual—several nests found.

RED-BACKED SHRIKE (*Lanius collurio*).—First observed, Fairmead, May 20th. Remarkably numerous in Warren Hill district—8 nests found. Several families observed on July 17th and 24th.

WHITETHROAT (*Sylvia communis*).—First observed Fairmead, April 18th—last seen, Long Hills, September 11th, 24 nests reported.

LESSER WHITETHROAT (*Sylvia curruca*).—Not so numerous as usual—first seen, Chingford Wood and Honey Lane Quarters, April 30th—last record, Chingford Plain, September 4th. Two nests found.

GARDEN WARBLER (*Sylvia simplex*).—Common; first date, April 30th, Chingford Wood. Two nests found.

BLACKCAP (*Sylvia atricapilla*).—Well distributed. First observed, April 28rd, Bury Wood.

GRASSHOPPER WARBLER (*Locustella naevia*).—Seen and heard on Warren Hill throughout season. First seen, middle of May. Nest not discovered.

WILLOW WARBLER (*Phylloscopus trochilus*).—First seen, Hawk Wood, April 3rd—last record, September 9th, Connaught Water. On April 17th, in spite of snow, sleet and piercing cold, the birds were singing well everywhere. Nests very common.

WOOD WARBLER (*Phylloscopus sibilatrix*).—First seen, April 30th, Hill Wood. Three nests found.

CHIFFCHAFF (*Phylloscopus collybita*).—First date, March 24th, Paul's Nursery—last observed, September 17th, Strawberry Hill. Several nests found.

MISSAL THRUSH (*Turdus viscivorus*).—Well distributed. Nest found Warren Hill. Observed eating fruit of service tree, October 16th and 29th.

BRITISH SONG THRUSH (*Turdus philomelos clarkii*).—Common—numbers decreased in winter months.

REDWING (*Turdus musicus*).—Very scarce compared with previous year—probably owing to failure of haw-crop.

FIELDFARE (*Turdus pilaris*).—Recorded only on December 25th, Highams Park.

BLACKBIRD (*Turdus merula*).—Abundant—with increased numbers in winter.

REDSTART (*Phoenicurus phoenicurus*).—First date, April 16th—last, September 19th. Four nests found.

BRITISH REDBREAST (*Erithacus rubecula melophilus*).—Common.

COMMON NIGHTINGALE (*Luscinia megarhyncha*).—First recorded, Paul's Nursery, April 22nd. Observed in usual localities in about same numbers. Three nests found.

STONECHAT (*Saricola rubicola*).—Nest found, Loughton, early July, young reared.

WHINCHAT (*Saxicola rubetra*).—A pair seen, Fairmead Bottom, September 7th.

WHEATEAR (*Enanthe enanthe*).—Observed on Chingford Plain, September 4th.

HEDGE SPARROW (*Prunella modularis*).—Well recorded. Several nests found (8 with Cuckoo's) first week in July.

WREN (*Troglodytes troglodytes*).—Very numerous. Several nests found; the unusual position of one calls for notice. This was built

completely inside a hollow in a pollard, in which a small hole gave access to the nest.

SPOTTED FLYCATCHER (*Muscicapa striata*).—First seen, Loughton, May 20th. Last observed, Fairmead Bottom, September 7th.

SWALLOW (*Hirundo rustica*).—First recorded from Chingford Plain and High Beach, April 28rd. Last seen, October 2nd. More records than in previous year—common on Chingford Plain previous to migration.

MARTIN (*Delichon urbica*).—First seen, Strawberry Hill, April 29th. Last record, Chingford Plain, September 11th. Appeared to be less plentiful than usual.

SAND MARTIN (*Riparia riparia*).—Chingford Plain, August 21st—the only record.

BRITISH GREAT SPOTTED WOODPECKER (*Dryobates major anglicus*).—The status of this species is well maintained, there being numerous records from the forest area between Chingford and Theydon. On March 12th, near Almshouse Plain, a male bird was observed taking grubs from marble galls which it first split open by repeated hammering. Four nests were under observation. In Hill Wood, a nest was found on June 4th, the young birds most vociferous. These had flown by the 12th. For the second year in succession a nesting hole in a crab tree, near Ludgate Plain, was found to be in use on May 15th. The young were heard "chanting" on the 28th. Near the same spot, a nest in a beech tree which had been used last year, contained young, May 28th. On June 12th a nest was found in Hawk Wood, in an ash tree, in which the young were calling. In Hill Wood, on June 12th and 19th, families of young, with adults in attendance, were moving about the trees.

LESSER SPOTTED WOODPECKER (*Dryobates minor*).—Recorded from High Beach, Loughton Camp, Warren Hill, Ludgate Plain, Woodman's Glade, Chingford and Almshouse Plains. A nest found at Warren Hill, early July. On February 27th, this bird was observed attacking marble galls, of which it split three whilst being watched.

GREEN WOODPECKER (*Picus viridis*).—Well distributed and recorded in every month of the year. Watched feeding on ants on Fairmead Bottom, October 2nd. During May the bird was seen at nesting hole in hornbeam, in Chingford Wood. Another nest found in an ash tree, near the Red Path, Chingford, on June 11th; parents seen and young heard.

CUCKOO (*Cuculus canorus*).—First observed, Fairmead, April 12th. Three nests of the Hedge Sparrow, each containing a Cuckoo's egg, were found during first week of July in thickets between Red Path and Epping New Road. Mr. H. C. Playne, of Bancroft's School, Woodford, gives the following interesting chronicle:—"One afternoon in June I noticed a Cuckoo repeatedly flying about my garden; and a few days afterwards it occurred to me that it might have been a hen looking for a nest in which to place an egg. So I examined the nests in my garden, and, on June 22nd, found a Robin in one of the boxes sitting on one of her own eggs and a Cuckoo's egg. This was the Robin's

second nest. She had already reared one brood in an old saucepan near the box. On June 29th I found the young Cuckoo had hatched; and the Robin's egg was lying just outside the box. The young Cuckoo flourished exceedingly, and was as vicious a creature as usual . . . When I was feeling doubtful whether it would be able to get out of the box, it came outside and settled down in some ivy just above the box. Three days afterwards it disappeared with the Robins, and I did not see it again." (See "Bird Notes and News," winter number, 1921.)

SWIFT (*Micropus apus*).—First seen, Loughton, April 29th; last date, August 23rd, Clay Ride. Better recorded than last year.

NIGHTJAR (*Caprimulgus europaeus*).—First observed May 12th, Clay Ride; last seen, August 30th, same place. On June 22nd at Sandpit Plain, "churring started at 9.50 p.m.—heard nightly at Warren Hill—nest found, middle of June, at Loughton.

KINGFISHER (*Alcedo ispida*).—Connaught Water, February 20th; two, one fishing, February 27th; May 18th and November 6th; Eagle Pond, July 23rd; Golding's Hill Pond, September 3rd; Strawberry Hill, October 2nd; nested near Staple's Hill.

TAWNY OWL (*Strix aluco*).—Chingford Wood, in flight and mobbed by Jays about noon, January 1st; in flight about 11.30 a.m. same place, January 22nd; Great Monk Wood, February 27th; near Ambresbury Banks, May 1st; Sandpit and Warren Plains, June 22nd; Black Bushes, mobbed by Jays, September 4th. Nested near "Royal Forest Hotel," young, late May.

LITTLE OWL (*Carine noctua*).—Chingford Plain, September 3rd.

SPARROW HAWK (*Accipiter nisus*).—Fairmead, April 10th. Nest found early May to the south of High Beach; four young hatched off.

KESTREL (*Falco tinnunculus*).—Buttonseed Corner, flying over, January 30th; over field near Blackbush Plain, calling, February 20th; Yardley Hill, April 3rd; Chingford Plain, April 23rd; two males over Warren Hill, August 21st; Fairmead Bottom, November 6th and December 18th. An observer writes that a pair were to be usually found on Fairmead—several others were seen hovering in various parts of the forest.

MUTE SWAN (*Cygnus olor*).—Seen on Connaught Water and Highams Park Lake in spring and autumn.

MALLARD (*Anas boschas*).—Frequently recorded from Connaught Water, also from Strawberry Hill Pond and Warren Pond. A brood of young seen on Connaught Water, May 11th; and two broods at the same place, June 4th.

POOCHARD (*Nyroca ferina*).—Connaught Water, one January 8th; 8 ♂ and 1 ♀, February 20th; and 2 ♂ and 1 ♀, March 13th.

TUFTED DUCK (*Nyroca fuligula*).—Connaught Water, 1 ♂, February 6th; 1 ♂ and 1 ♀, February 20th.

COMMON HERON (*Ardea cinerea*).—Mr. McKenzie reports on the Wanstead Heronry as follows:—"The keeper counted 69 nests, which is pretty well up to the average, and I think the hatch was a fairly successful one."

WOODCOCK (*Scolopax rusticola*).—One flushed by Keeper Stubbs, at Broomhill, on December 12th.

CURLEW (*Numenius arquata*).—Calls were repeatedly heard from a large flock that passed over Loughton at night on September 7th.

LAPWING (*Vanellus vanellus*).—One flying over Long Hills, March 18th.

BLACK-HEADED GULL (*Larus ridibundus*).—Four on Connaught Water, December 4th.

LITTLE GREBE (*Podiceps fluviatilis*).—Party of 4 nestlings seen with parent birds at the end of July on the Eagle Pond.

MOORHEN (*Gallinula chloropus*).—Recorded from Connaught Water, Strawberry Hill Pond, and Highams Park Lake. Two adults and three young frequented the pond at Cuckoo Pits during July and August. Observed throughout season on the Eagle Pond, Snaresbrook, where thirty were noted at one time. On December 18th there were 27 on the lake at Highams Park.

RING DOVE (*Columba palumbus*).—Chingford Wood, (flock) January 1st and 30th and February 26th; near Red Path (flock), January 8th; Cuckoo Pits, February 5th and 20th; Hill Wood, April 3rd and 10th; Fairmead (flock), April 3rd; Honey Lane Quarters, April 30th; Fairmead Bottom, October 16th; near "Robin Hood," October 23rd; Long Hills, November 13th; Black Bushes, (several flocks), November 19th; Whitehall Plain (flock), December 18th.

PHEASANT (*Phasianus colchicus*).—Round Thicket, March 19th, Long Hills (five), November 6th; Warren Plain, November 13th.

PARTRIDGE (*Perdix perdix*).—Almshouse Plain and Long Hills, February 20th; Theydon Bois, July 3rd.

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REDSHANK AT NEST, TEXEL.

[Frontispiece.]

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THE EXTREME "LOCALNESS" OF CERTAIN SPECIES

By E. B. BISHOP

Presidential Address read at the Annual General Meeting on December 5th, 1922.

FOR very many years it has been to me a constant puzzle why some species should be so extremely "local," in our naturalist technical sense, *i.e.*, why they seem to be confined to an almost rigidly limited and frequently tiny area. In the immediate neighbourhood there is often plenty of apparently equally suitable habitat, seemingly alike in geological formation, exposure, moisture, and so on. Yet year after year we can depend upon finding our plant or insect in its chosen spot, and old records often show that it was there 60, or 100, or more, years ago. Of course, these observations of mine are not original; every intelligent naturalist has had similar experiences. In my boyhood's days, I remember reading—I think it was in Knaggs' "Lepidopterist's Guide"—a reference to this peculiarity, that one species of insect would, year after year, haunt a particular corner of a particular field, and no other spot in a district.

A few records, chiefly of plants, from my own experience, may be given as illustrations:—

Senecio campestris, the Field Fleawort, so far as I know or can obtain records, occurs in Surrey in only one locality, on the chalk downs not far from Godalming, over an area of perhaps an acre or so, and there is not uncommon. Along the whole of the southern slopes of the Surrey Downs, from the Kent boundary to that of Hampshire, there are miles and miles of ground apparently identical in respect of soil, elevation, slope, exposure, surroundings, etc. *S. campestris* is a Composite plant, with the usual seed appendages of that order, specially adapted for wind distribution. Near by, the turf is often cut for making lawns, so that new ground is made ready for colonization, and many plants, including such Composites as Knapweeds, Thistles and Hawkbits, soon establish themselves, but I have never found *S. campestris* amongst them.

Cynoglossum montanum, the Green-leaved Hounds-tongue, also, so far as I know, is found in Surrey in only one locality, not very far from Leatherhead, where it is abundant over a restricted area. This is a plant of shady woodland, and I know many a shady wood in that district where, apparently, it ought to be found, but is not. Again we have a plant whose seed is specially adapted for distribution, though in a totally different manner from that previously mentioned.

The large burry seeds readily attach themselves, by their hooked bristles, to the hair or fur of animals, or to the clothing of human beings who prowl about in its haunt.

Cynodon Dactylon, the Dog's-tooth Grass, found only in three or four localities in Britain proper, is very abundant in its principal Dorset station, at Studland. But this species also appears to restrict itself—I use the expression advisedly, as you will find later on—appears rigidly to restrict itself to a small area of blown sand, in the congenial company of such floral aristocrats as *Trifolium suffocatum*, *T. glomeratum*, and *Trigonella ornithopodioides*. *C. Dactylon* is a most vigorous growing grass, its creeping runners travel for yards, and all around are acres of bare or thinly-colonised sand, awaiting attention. It also flowers and seeds in fair quantity, but I have no knowledge as to its colonising power from seed.

Dryas octopetala, the Mountain Avens, occurs in four English counties. I know it only from Teesdale, where it has but one station, a sugar-limestone fell summit. Here it is abundant, over a space of perhaps rather less than an acre. Indeed, much of this area is so densely carpeted by *Dryas* that even common plants are almost elbowed out. Two or three more sugar-limestone patches are to be found near by, and several others across the Tees within a mile or so. *D. octopetala* has winged seeds specially adapted for wind distribution, and the winds are usually strong on these fell tops. But, apparently, the species will not spread beyond its chosen domain.

These four species are the most remarkable examples of “localness” of which I have intimate personal knowledge, all specially adapted for colonisation, and yet all, apparently, so markedly disdainful of spreading themselves by means of these special privileges.

But other instances, only a degree or so less remarkable, have also come under my notice. *Helianthemum polifolium*, the White Rock-rose, occurs on two of the Mendip hills, in Somerset, about two miles apart, and nowhere else in Britain, save at one station in South Devon. Along the whole range of Mendip, dozens of apparently equally suitable spots are to be found, but no *H. polifolium*. In this species, however, so far as I know, the seeds are not specialised for wide distribution.

Another plant of the same genus, *H. canum* var. *vineale*, is said to occur in only one locality in Britain, on the sugar-limestone in Teesdale. Here, I have found it in some quantity, but only on one particular fell summit, a short half-mile from *Dryas octopetala*, already mentioned. Each of these two species seems here rigidly to respect the territory of the other. Near at hand, another rarity, *Draba incana*, the Hoary Rock-cress, is scattered about freely. The last-mentioned species is to be found upon the *H. vineale* summit, but not, so far as I noticed, upon that sacred to *D. octopetala*. The whole fell provides another instance of that friendship, in this case without undue familiarity, between floral aristocrats. It must be added that the seeds of both *H. vineale* and *D. incana* are not specially adapted for distribution, but the almost continuous strong winds must certainly carry small seeds to considerable distances.

Many other plants could be cited, further illustrating my theme, but I do not wish to make this address unduly long, so will now devote a few minutes to similar apparent eccentricities observed by me in insects.

My experiences here are much more limited than they are with plants, but I have a most vivid recollection of my first acquaintance with the Lulworth Skipper butterfly, then known as *Hesperia actaeon*. It is now nearly forty years ago since that time when, in company with my brother (long since passed away), I set out for a long tramp from Weymouth to the recorded station for this species at the Burning Cliff. All the way out we assumed that it could only with difficulty be distinguished from the common *H. linea*. I am using the old names, as befits old times. I have a dim idea that, in consequence, many an unfortunate *linea* was arrested on suspicion *en route*. But when we arrived at the spot *actaeon* at once showed itself, even to our inexperienced eyes, as something very different from its humble relative. We were amazed at its abundance, and after taking many more than we really needed, amused ourselves by seeing how many we could catch with one sweep of the net. Five was, I believe, the maximum. We were also mystified to find that, within the *actaeon* domain, *linea* appeared to be absent, or almost so. I cannot recollect the actual extent of the area, but think it must have comprised some hundreds of yards of sunny undercliff. The boundary seemed quite artificial, within *actaeon* in abundance, without this insect was hardly to be found. I hasten to add that, at the period mentioned, we were quite content to be enthusiastic collectors. Natural History theories were then far beyond the limits of our mental horizons. I understand that *actaeon* is to be found in several places eastward on to Swanage, but have never since seen it on the field.

The extreme "localness" of certain other butterflies has been frequently brought under my notice, in the course of many years, wanderings. Here are a few of them.

The White Admiral, abundant in the New Forest, and to be found freely in certain woods and lanes near Haslemere, is strangely absent from most woods, even in the South of England. Yet honeysuckle, its foodplant, is everywhere common, and I do not know that it has any exceptional natural enemies.

The Marbled White has been found by me in three or four spots, always intensely local, and usually abundant in its chosen haunts. It appears to feed on various grasses, and has, presumably, no specially active enemies. In connection with this insect, on consulting Newman's "British Butterflies" concerning its foodplant, I was very interested to find the following:—"In all the southern counties it occurs not uncommonly, but always in restricted spaces, generally confining itself to a single field or rough pasture."

The Little Blue I have always noticed to be very local, but abundant where found. Its recorded foodplant, the Lady's Finger (*Anthyllis Vulneraria*), though not seen everywhere, is certainly not a rare species.

Similar remarks may be made concerning the Adonis Blue, and the Silver-spotted Skipper.

It must be noted that the feeblest-winged butterfly has far greater powers of distribution than any plant of those mentioned. Only the Little Blue can be called feeble, whilst the White Admiral is distinctly strong on the wing.

Here then are a few facts, in the main indisputable, and no doubt many ingenious theories can be put forward to account for them. So far as I am concerned, I have nothing so elaborate or scientific as a theory to advance, but merely a commonplace and by no means original suggestion, which will probably sound fantastic to most of my audience. But then I am not a scientist, only a naturalist, in so far as that term implies a sympathetic observer of nature. One of the articles of the prevailing scientific creed, elevated (or otherwise) into a rigid dogma by many of its adherents, that every action of every member of every species is wholly utilitarian, is, I suggest, as fallacious when applied to other animals and to plants as it is when applied to man. To me, it is conspicuously obvious, that mankind, especially as regards its most necessary sex, is wilful rather than rational, for which God be praised! And I suggest that all other creatures, in greater or lesser degree, possess that most charming attribute. Having no scientific reputation to lose, I put forward the simple explanation that the plants and insects mentioned are, in many cases at least, "local" because they prefer to remain so. Of course, I do not dispute the tremendous importance of such external factors as the struggle for existence, environment, and the like, as affecting the distribution of a species and also its evolution. But I have long since ceased to regard all living creatures as so much raw material, entirely at the mercy of external forces. The impulse from within, call it what you will, whatever may have been its origin, is, I am convinced, the vital factor in the scheme of things. Indeed, I cannot comprehend any evolution, especially the beginning of the formation of new organs, without such hypothesis. Whilst discussing this point with a friend and fellow-member of this Society, he informed me that it was a Lamarckian conception. As I must plead guilty to not having read a line of Lamarck at first hand, I felt somewhat in the position of the hero in Molière's most famous comedy.

In case anyone should be preparing to accuse me of sentimentalism because I have promulgated these views to-night, I hasten to assure my potential critic that I shall take such accusation as a high compliment. Sentiment, intuition, whatever you choose to call it, is to me usually a far safer guide than intellect or reason, just as legend is on a higher plane than history, and romance than realism.

This address has already exceeded the limits of space originally set by me upon it, and I am quite aware that further elaboration of the views set out herein must inevitably take the form of a definite challenge from a wofully ill-equipped David against the formidable Goliath-like creed which dominates modern science. No such heroic purpose is mine to night. Having shown, to my satisfaction, that animals and plants may possess similar amiable weaknesses to our own, the sum total of my poor reflections merely amounts to a plea for a sympathetic

and more personal attitude toward all living creatures instead of a coldly studious scientific one, a recognition of kinship with them rather than the point of view of a detached spectator of their activities. Some of our very recent addresses have been on such lines, notably that most fascinating illustrated life history of the Sparrow Hawk, by Mr. Owen.

It is of course necessary that we should preserve a certain proportion of faunal and floral corpses, more or less artistically set out in our bird collections, our insect cabinets, and our herbaria, and that we should study their pickled fragments in test tubes, and slices of them through our microscopes. Great as is the value of all these, they are but subsidiary details to the true naturalist. To him, or to her, one breathless momentary sight of a Peregrine Falcon by its home on a cliff is worth a whole bird collection : one vivid memory of the inimitable flight of a White Admiral butterfly more precious than the survey of serried rows in a cabinet drawer ; whilst the most perfect herbarium shrivels into wisps of hay before the never-to-be-forgotten vision of the gold-purple Mountain Pansy gemming a Teesdale pasture.

On no account must we give up our collections, and our microscopes, but let them take their place in our scheme of things. We add greatly to the fulness of our own lives when we regard the teeming various members of the fauna and flora around us as something more than subjects for study, or as prospective specimens. Some are our deadly enemies, and must be frankly and remorselessly treated as such, but in the main let us regard the others as living entities, joy-loving creatures, our fellow-travellers and comrades in life's journey on this wonderful and fascinating world.

COUNCIL'S REPORT

THE Council, in presenting the annual report, although not able to state that the horizon has been free from clouds at any time, can say that the course of our affairs has not been without its brighter aspects.

The work of the year may be divided into three categories, that which must be regarded as retrogressive, that which, at least, has maintained its position, and lastly that which can claim to have made progress.

Unfortunately in the first category must be included one of, if not the, most vital of our interests, an interest which may be described as the pulse of our affairs and which in greater or less degree affects the whole of our work, the question of finance. At present the income which is derived from subscriptions and entrance fees is not sufficient to meet the annual outgoing expenses even with the exercise of the most rigid economy, and the Society has been carried on recently only by the generosity of an exceedingly limited number of members. It is not easy to say whether this income is rising or falling, but even allowing that the influx of new members at the present rate will eventually right matters, it must be clear that as no further economies are possible, the Society for some time to come can continue only by further voluntary assistance from its present members.

The papers contributed at the Society's meetings can be placed safely in the second category, and although it is not easy to effect a comparison, 1922, in this respect, appears to be in no way behind 1921, which was a good year. The programme of field meetings was again a heavy one, no fewer than 35 having been organised throughout the year. The importance of these field meetings cannot be too much emphasised, as a well organised programme of such excursions will render the Society of increasing value to the members and serve as a means for the introduction of the much needed prospective members.

The state of the membership is not easy to gauge. Finance has already been described as the pulse of the Society, and probably no better indicator of the position of the membership can be found than the state of the Society's income. During the year we have lost by death and resignation one honorary member, 9 members, 4 associates and 2 country associates. Against this 12 members and 10 associates have joined the Society. Increase of members is the only solution of the problems with which we are confronted, and the members are urged to leave no path unpursued that may lead to the desired result. If every member could introduce one new member in the coming year the position of the Society would be firmly established.

Although the attendances at Winchester House still leave room for improvement, we are justified in placing this aspect of our affairs in the third category. The attendances this year average 26·0 per meeting, as compared with 24·3 in 1921 and 21·1 in 1920.

The Council recommended to the Publication Committee that the Transactions should be published under the title of "The London Naturalist," which, as you are aware, is the title under which the 1921 volume appeared. The sum required to meet the cost of this volume is heavy, but it is felt that the publication of Dr. Cockayne's paper was justified on account of the value which is thus added to the Transactions. The usual appeal is made for donations to this important fund.

Continuity of office and policy are no doubt the causes which enable us to say that the Chingford Branch under the energetic leadership of Messrs. A. G. Hubbard and E. Samuelson, chairman and secretary respectively, has made further progress.

The more important features of our work have been touched upon and the weaknesses have been localised. What remedial measures can we adopt in the future? Special discussions have been devoted to means of increasing our membership, but the probability is that no specific remedy will be found. To reap the desired success we must see that all departments of our work are carried out with the strictest efficiency and attention to detail. No opportunity should be considered too small to be seized and followed up. It does not seem to be fully realised that a natural history society is much in the position of a business. A business succeeds in the main by the quality of its goods, and this applies equally to a natural history society. It is the society which delivers the goods, that will obtain, at the expense of its competitors, additions to its ranks. Let us see that we deliver the goods, that is, that we make our meetings of the required interest. The business of the natural history society is the practical study of those objects which fall within the scope of its work, and the extent to which this is applied will be reflected in the measure of its success.

WILLIAM E. GLEGG, *Hon. Sec.*

REPORTS OF THE SECTIONS

ARCHAEOLOGICAL SECTION

DURING the year one member resigned and five were elected, bringing the membership up to 25.

Five sectional meetings were held during the year, one being added besides the four allotted to the Section in the Society's Rooms. These were largely occupied with the discussion of the Section's Records which have raised many points of importance. At two of these meetings, however, valuable papers were read; one by Mr. Bishop on "Further Notes on Cotswold Churches," and the other by Dr. Simpson on "English Gothic Arch Mouldings."

Seven inspections were made during the year, namely:—Bedfont Church, Middlesex (a second formal visit, the first took place in 1921) on February 18th; and three other formal visits—to Margaretting Church, Essex on March 25th, Waverley Abbey, Surrey on July 15th, and the Church of St. Olaves, Hart Street, E.C., on November 25th. Records of these four have been compiled or are in the course of compilation, and will be in due course in the Society's library. The other three were informal visits—Chipstead Church, Surrey on March 6th, Cliffe at Hoo Church, Kent on September 16th; and Grew Bookham Church, Surrey on October 28th.

The attendance was decidedly better this year, both at the indoor and the outdoor meetings (including the informal meetings), but still there is ample room for improvement.

The recording scheme was continued with great success, under the leadership of our Recorder, Mr. Stowell. A new member, Mr. Foster, kindly offered to deal with the Brasses. His work will be a valuable feature in our records.

The third Annual Dinner of the Section was held at the Ship Restaurant, Whitehall, on February 1st, when Dr. Simpson was the guest of the evening. The function was well attended and much enjoyed.

DOUGLAS B. ALLINGHAM, *Hon. Secretary.*

ARCHAEOLOGICAL INSPECTION

St. Mary Bedfont, Middlesex.—Visited February 18th, 1922.

A second visit was made to confirm one or two points in discussion, the result of which is noted in the record now in the library.

We are pleased to report that the Vicar has accepted a copy of the

record, and is allowing Mr. Stowell to co-operate with him in the compilation of a guide, copies of which will, we hope, in future be in the church for the general visitor's benefit.

St. Margaret, Margareting, Essex.—Visited March 25th, 1922.

Our visit to this interesting Essex church emphasized in no small degree the importance of our recording scheme, and proved a justification of the trouble taken by each member in accurately describing what is to be found to-day, the modern references, even by reputed ecclesiologists, being far from accurate.

Much of the brick walling and a south chapel were cleared away some fifty years ago.

The fine old timber belfry, with its huge timbers and wooden tracering windows, was built in the 14th or 15th century, when it was fashionable to displace the single bell by a peal.

The porch on the north is a fine example of woodwork treatment of the same period.

There is only one aisle on the south, divided from the nave by an extremely interesting arcade, which, after much discussion, was dated by us—not of the early English period as stated by the authorities—but 200 years later.

The Jesse window at the east end is worthy of note.

St. Margaret, Chipstead, Surrey.—Visited May 6th, 1922.

The informal visit to this charming cruciform church aroused sufficient interest for us to note this church as worthy of an official recorded visit at some future time.

Apart from the interesting plan, the Norman north door and the triangular headed windows (particularly as viewed from the N.E.), in the chancel and transept, we noted reasons for comparing Chipstead with Merstham, which is close at hand, and with the more distant building of Cliffe at Hoo, Kent.

Waverley Abbey, Surrey.—Visited July 15th, 1922.

Under the guidance of Mr. Chapman we explored these picturesque ruins, and reconstructed in imagination that great church, with its attendant buildings.

We noted with dismay further recent collapse, and had cause to disagree with the naming of some portions of the remains.

Very full notes, illustrated by photos, are in our library, and should be borrowed by anyone acquainted with this delightful corner of Surrey.

Cliffe at Hoo, Kent.—Visited September 16th, 1922.

In the north of Kent, opposite Canvey Island, is a little-known church, suggesting a small cathedral. This was informally visited by us with a view to a future record.

The typical early English cruciform plan, with its tower at the

west end and two-storied porch, gives a noble effect. The whole church bristles with points worthy of our further attention.

The Rev. Alfred T. Wallis entertained us at his mediaeval rectory.

St. Giles, Ickenham, Middlesex.—Visited October 7th, 1922.

Informally visited by a few members, in conjunction with the Plant Gall Section.

Chief point of interest is an early 17th century mausoleum, showing vertical coffin recesses, only recently brought to light.

St. Nicholas, Great Bookham.—Visited October 28th, 1922.

Our informal inspection showed us a Norman nave with aisles and tower with steeple at west end. The chancel is dated 1341.

The 14th century south porch had at one time a room over it—the outline of a doorway leading up to this room remains.

St. Olave's, Hart Street.—Visited November 25th, 1922.

At the corner of Seething Lane stands to-day one of the few mediæval churches which escaped the Great Fire.

The grouping of the clustered columns dividing the nave from the aisles has a good effect, though somewhat late Gothic in design. The tower is placed at the west end of the south aisle.

We trust that the crypt, which we believe to exist, will at some future time be opened up, and that thus further light will be thrown upon the history of mediæval London.

The record in our library gives good descriptions of the church and monuments, etc.

Samuel Pepys often worshipped in this church, and he and Turner, theological controversialist and botanical writer, were buried here.

BOTANICAL SECTION

THE necessity for economy in the Society's expenditure is as urgent as ever, consequently this report has been cut down almost to a minimum.

The Section week-end at Birling, Kent, towards the end of May, was most enjoyable, and a distinct success from every point of view. The most interesting species found were *Orchis purpurea*, Huds., *Salvia pratensis*, Linn., *Helleborus foetidus*, Linn., and *Ajuga Chamae-pitys*, Schreb., the two last in some quantity.

Other excursions were not so well attended as they should have been, and the same may be said of the sectional meetings. All members are requested to do their utmost to introduce capable new recruits to the Section, and the Society generally.

At one of the sectional meetings, Mr. L. B. Hall stated that, in several herbaria examined by him, he had found *Sisymbrium Irio*, Linn, confused with *S. Columnae*, Jacq. As this has probably been of

frequent occurrence, records for these species should be examined. He drew attention to the following distinctive characters. In *Columnae* the pods are stout compared with those of *Iris*, and are not narrowed to a neck at the base, the pedicels are short and stout, and about the same width as the pod, whilst the upper leaves are usually entire, not pinnatifid.

Juncus tenuis, Willd., was found on one of the excursions by Mr. R. W. Robbins. It was well established by the roadside near Old Mill Farm, Ashdown Forest, Sussex, and there were also a few plants in a ride of a wood about a quarter of a mile away.

During the year 10 species have been added to our records for the Northern portion of our area, and 45 for the Southern, the latter including 35 *Rubi* recorded on the authority of Mr. W. Watson. One, *R. fuscus*, Wh. & N., var. *macrostachys*, P. J. Muell. (Lon. Cat., 10th edn.), from Chislehurst Common, is apparently a first record for Kent.

The Committee appeals to all members to send to the Recorder complete lists of their records *within the Society's district*, even of the most common species, with specimens, whenever possible, in all cases of rare or critical plants.

R. W. ROBBINS, *Chairman*.

E. B. BISHOP, *Secretary*.

LEPIDOPTERA SECTION

THE work of the Section during the past season has been confined almost exclusively to field meetings, and it is gratifying to be able to record evidence of an increasing interest in this branch of the Society's work, the meetings, especially the earlier ones, having been well attended.

On February 25th a party of ten members and visitors engaged in a search for *Sesia andrenaeformis*, on the downs above Leatherhead. The insect was not known to occur here, and although one old working was found, it is clearly not abundant. Larvae of *Boarmia abietaria* and *Geometra vernaria*, and imagines of *Anisopteryx aescularia*, were taken.

On March 18th the afternoon was spent on Arbrook Common and Oxshott Heath. *Anisopteryx aescularia*, *Brephos parthenias*, and *Asphalia flavicornis*, were taken at intervals during a most enjoyable afternoon.

On April 1st, a cold and cheerless day, an attempt on *B. parthenias* ab. *flava*, met with no success, and few of the type were on the wing.

On May 28th a party of five visited Horsley and took *Brenthis euphrosyne* and other species.

On June 30th some twenty *Dicycla oo* were taken by a small party under the leadership of Mr. H. W. Wood.

E. A. COCKAYNE, *Chairman*.

HAROLD B. WILLIAMS, *Hon. Secretary*.

ORNITHOLOGICAL SECTION

THE Annual Meeting of the Section was held on December 5th, when the following officials were elected to form the Committee for 1928:—Mr. W. E. Glegg, Chairman; Mr. S. Austin, Secretary; Mr. A. Brown, Recorder; together with Messrs. C. S. Bayne, J. E. S. Dallas, and P. J. Hanson. Mr. J. E. S. Dallas was elected to represent the Section on the Publications Committee.

The Section provided the following papers for the Society's syllabus, which were read at ordinary meetings, *viz.*, on May 2nd, "The Birds of Texel," by Mr. W. E. Glegg, M.B.O.U.; November 21st, "Some Observations on the Life History of the Sparrow Hawk," by Mr. J. H. Owen, M.A., M.B.O.U.

Three sectional meetings were held at which the following papers were read, *viz.*, on April 25th, "Some Breeding Birds of the London District," by Mr. D. H. Meares; June 20th, "Notes on some European Birds," by Mr. J. E. S. Dallas; September 19th, "Economic Ornithology," by Mr. H. H. Wardle, F.R.H.S. On September 11th, Mr. J. Ross read a short paper on the "Woodpeckers of Epping Forest," to the members of the Chingford Branch; and on November 18th, Mr. W. E. Glegg gave a lecture entitled "An Ornithologist's Holiday in Holland," at the same place.

For the third year the monthly field meetings were successfully carried through, affording useful and interesting opportunities for co-operative field work. The following visits were made:—

DATE.		DISTRICT.	LEADER.
January	29.	Tring... ..	Mr. P. J. Hanson.
February	26.	Stanford-le-Hope ...	Mr. P. W. Horn.
March	26.	Burnham-on-Crouch..	Mr. W. E. Glegg.
April	30.	Tadworth	Mr. J. E. S. Dallas.
May	28.	Weybridge	Miss H. Watkins.
June	25.	Three Bridges	Mr. C. S. Bayne.
July	30.	Wendover	Mr. J. P. Hardiman.
August	27.	Fanbridge	Mr. W. E. Glegg.
September	24.	South Weald	Mr. P. W. Horn.
October	29.	Hunsdon	Mr. P. J. Hanson.
November	26.	Epping Forest	Mr. J. Ross.
December	31.	Canvey Island	Mr. S. Austin.

The Committee of the Section held three meetings during the year.

The work of recording the birds observed in Epping Forest was continued, and the Seventh Annual Report is printed below.

Under the "British Birds" marking scheme 58 birds were ringed during the year.

Seventeen additions were made to the Photographic Collection during the year, which now numbers 133 sheets.

Six species new to the Society's district have been recorded, making the total number 168. These new occurrences are:—*Musi-*

capa atricapilla (Pied Flycatcher), D. M. Meares reported (27.4.17), per A. B., "quite ten years ago I observed one in Thorndon Park, Brentwood, in May, and it remained there for about a week"; *Falco subbuteo* (Hobby), at Enfield, early September, 1921, reported by R. B. Lodge, per S. A.; *Mergus merganser* (Goosander), at least 60 seen on Staines Reservoirs, February 18th, 1922 (see "British Birds," vol. 16, p. 25); *Mergus serrator* (Red-breasted Merganser), 4 on Staines Reservoirs, February 18th, 1922 (see "British Birds," vol. 16, p. 25); *Mergellus albellus* (Snew), 3 ♂ with 5 or 6 ♀, Barnes Reservoirs, February 25th, 1922, reported by J. Rudge Harding, per S. A.; and 1 ♀, Walthamstow Reservoirs, March 18th, 1922, reported by W. E. G. and S. A., see also "British Birds," vol. 16, p. 25; *Podiceps nigricollis* (Black-necked Grebe), between January 31st and February 24th (on 4 occasions), Staines Reservoirs, see "British Birds," vol. 16, p. 25.

Other interesting records for the year are as follows:—*Pica pica* (Magpie), April 9th (2), July 2nd and 25th, all at Limpsfield, and August 18th (5), Itchingwood Common, reported by R. W. R.; December 26th, Navestock, reported by W. E. G.; *Spinus spinus* (Siskin), April 29th, Epping Forest, reported by P. D. Hayward, per S. A.; November 26th, Epping Forest, reported by W. E. G.; *Emberiza calandra* (Corn Bunting), April 20th, Staines Reservoir, singing continuously, reported by W. E. G.; *Motacilla boarula* (Grey Wagtail), January 1st, Springfield Park, and April 2nd, Coppermill Lane, reported by R. W. P.; January 8th, 14th, 15th, 21st, February 5th and 12th, Epping Forest, reported by S. A., W. E. G., and J. R.; October 8th, Theobald's Park, reported by P. J. H.; *Phoenicurus gibraltariensis* (Black Redstart), ♂ from March 19th until 25th, and young ♂ (singing) on May 20th, Tadworth (see "British Birds," vol. 16, pp. 49 and 50); *Saricola rubicola* (Stonechat), October 29th, R. Lea, Upper Clapton, reported by R. W. P.; *Eranthe cwanthe* (Wheatear), April 21st and 23rd, Wanstead Golf Links, reported by A. C.; May 7th, Epping Forest, reported by H. C. Playne, per S. A.; August 20th, ♀ and 2 young, Staines Reservoir, reported by W. E. G.; August 26th (3), and September 9th, Walthamstow Reservoirs, reported by W. E. G.; *Microtus apus* (Swift), April 23rd (early date), Walthamstow Reservoirs, reported by R. W. P.; *Carine noctua* (Little Owl), April 5th, Richmond Park; June 11th, Ham Avenues, both reported by G. W. T.; *Buteo buteo* (Buzzard), June 14th, Epsom Downs and Tadworth (see "British Birds," vol. 16, p. 220); August 27th, Dulwich ("British Birds," vol. 16, p. 116); October 1st, Tadworth ("British Birds," vol. 16, p. 191); *Falco peregrinus* (Peregrine), February 26th, 2 flying over Brompton Road (see "British Birds," vol. 15, p. 270); *Anas strepera* (Gadwall), March 9th, ♂, Kensington Gardens, reported by R. W. P.; *Querquedula crecca* (Common Teal), January 22nd and March 16th, Penn Ponds, Richmond Park, reported by G. W. T. and J. E. S. D.; *Mareca penelope* (Wigeon), May 1st, 1 ♂ and 2 ♀, Barnes Reservoir, reported by J. Rudge Harding, per S. A.; December 26th, Navestock, reported by W. E. G.; *Spatula clypeata* (Shoveler), October 8th, 2 ♂, Walthamstow Reservoirs, reported by A. B.; *Glaucion clangula* (Golden-eye),

flock of about 25 wintered on Staines Reservoirs (see "British Birds," vol. 16, p. 25); *Oedemia nigra* (Common Scoter), April 18th, immature or ♀, Staines Reservoir (see "British Birds," vol. 16, p. 25); *Ardea cinerea* (Heron), a new Essex Heronry formed at Walthamstow Reservoirs, reported by W. E. G. (see "British Birds," vol. 16, p. 51); *Erolia alpina* (Dunlin), April 9th, 3 on Staines Reservoirs (see "British Birds," vol. 16, p. 26); *Tringa totanus* (Redshank), May 7th and 20th, June 11th, July 15th, Walthamstow Reservoirs, reported by W. E. G. and R. W. P.; *Tringa hypoleucis* (Common Sandpiper), August 20th, Staines Reservoir, reported by W. E. G.; August 26th (9), August 31st and September 9th (13), Walthamstow Reservoirs, reported by W. E. G. and R. W. P.; *Pluvialis apricarius* (Golden Plover), December 26th, Stanford Rivers, reported by W. E. G.; *Squatarola squatarola* (Grey Plover), April 9th, 6 on Staines Reservoirs (see "British Birds," vol. 16, p. 26); *Larus canus* (Common Gull), one seen on the Racecourse Reservoir, Walthamstow, on April 30th, May 6th and 7th, reported by R. W. P.; *Colymbus stellatus* (Red-throated Diver), March 12th and 19th, one in winter plumage, on Penn Ponds, Richmond Park, reported by G. W. T.; *Podiceps cristatus* (Great Crested Grebe), April 20th, party of 160 on Staines Reservoirs, reported by W. E. G.; *Charadrius hiaticula* (Ringed Plover), September 9th, Walthamstow Sewage Farm, reported by W. E. G.

We have again been assisted in our recording by several correspondents outside the Society, to whom our thanks are due, *viz.*, Messrs. R. S. Archbold, T. M. Blagg, T. G. Davey, J. Rudge Harding, P. D. Hayward, R. B. Lodge, F. F. McKenzie, D. M. Meares, H. C. Playne, and Keeper Stubbs.

Five new Members and two Associates of the Society have joined the Section during the year, *viz.*, Members: Miss. N. Aldred, and Messrs. E. J. Davis, C. H. Payne, H. F. Spender, and H. Spooner. Associates: Mr. W. A. Wright and Dr. R. Patterson.

W. E. GLEGG, *Chairman*.

S. AUSTIN, *Secretary*.

A. BROWN, *Recorder*.

PLANT GALL SECTION

THE Section held two meetings in the year, that on May 16th being devoted to a paper and discussion on the galls on *Cupuliferae*. Five expeditions were undertaken, the districts visited being Knockholt, Uxbridge, Ickenham, Epping Forest and Bookham. Exhibits and observations were made at the Society's ordinary meetings. The following list of the more interesting records is compiled from those sent in by members during the year.

Eriophyes genistae, Nal., on *Cytisus scoparius*, Link. (L. B. Hall).
E. varius, Nal., on *Populus tremula*, Linn., Surrey (H.J.B.). *E. rubiae*, Can. (Houard 5821), on *Rubia peregrina*, Linn., Somerset (L.B.H.).
E. rubiae (Houard 5822) on *R. peregrina*, Linn., Cornwall (H.J.B.).

E. galii, Karp., on *Galium tricornue*, With., Dorset (E. B. Bishop). *E. geranii*, Can., on *Geranium molle*, Linn., Cornwall (H.J.B.). *E. hippocastani*, Fockeu, on *Aesculus hippocastanum*, Linn., Surrey (H.J.B.). *E. convolvens*, Nal., on *Euonymus europaeus*, Linn., Somerset (L.B.H.). *E. pyri* on *Pyrus aria* var. *rupicola*, Syme, Somerset (L.B.H.). *Eriophyes* sp. on *Rumex acetosella*, Linn., Cornwall (H.J.B.). *Phyllocoptes minutus*, Nal., on *Asperula cynanchica*, Linn. (L.B.H.). *Aphis euonymi*, Fabr., on *Euonymus europaeus*, Linn., Somerset (L.B.H.). *Perrisia Dittrichi*, Rübs., on *Silene pratensis*, Besser, Somerset (E.B.B.), Surrey and Bucks (H.J.B.). *P. aceris* spans var. *rubella*, Kieff., on *Acer campestre*, Linn., Surrey (H.J.B.). *Perrisia* sp. on *Solidago virgaurea*, Linn., Cornwall (H.J.B.). *Contarinia* sp. (Houard ? 2266) on *Silene maritima*, With., Cornwall (H.J.B.). *Lasioptera populnea*, Wachtl., on *Populus tremula*, Linn., Surrey and Berks. (H.J.B.). *Andricus glandulae*, Schenck, on *Quercus sessiliflora*, Salisb., Yorks (H.J.B.), and on *Q. pedunculata*, Ehrh., Yorks (H.J.B.). *A. testacipes*, Hartig., on *Q. cerris*, Linn., Yorks and Surrey (H.J.B.). *A. circulans*, Mayr., on *Q. cerris*, Linn., Yorks (H.J.B.). *A. curvator* Hartig., on *Q. robur* var. *intermedia*, D.Don., Somerset (L.B.H.). *Neuroterus baccarum*, Linn., and *N. vesicator*, Schl., both on *Q. robur* var. *intermedia*, D.Don., Somerset (L.B.H.). *Dryophanta disticha*, Hartig., on *Q. sessiliflora*, Salisb., Cornwall (H.J.B.). *Tylenchus devastatrix*, Kuhn, on *Geranium molle*, Cornwall (H.J.B.).

The Section considered in February a suggestion made by Mr. Wm. Falconer of Huddersfield for the formation of a closer working agreement between those interested in the study of Plant Galls, and for a Committee to decide questions of nomenclature, etc. The Section heartily supported the idea, but as it was found impossible to obtain the co-operation of all the leading workers, no definite result was reached, though the idea has not been abandoned.

HAROLD J. BURKILL, *Hon. Secretary.*

CHINGFORD BRANCH

THE interest in the Branch has been well maintained. The attendances at the meetings averaged 30·75 against 28 in 1921. The lowest was 14 and the highest 37.

The following lectures and papers were given at the indoor meetings:—"Nature in New Zealand," by Miss Hibbert-Ware, F.L.S.; "Monumental Brasses," by A. G. Hubbard, B.Sc.; "The Rotifers," by E. R. Newmarch, F.R.M.S.; "Some Lower Forms of Ocean Life," by Rev. H. J. Gamble, M.A.; "Locomotion in Plants," by J. G. Everett, Ph.C.; "The Birds of Texel," by W. E. Glegg, F.Z.S. Two short papers on Epping Forest were read on one evening by the Chairman and J. Ross, the former historical, the latter on "The Woodpeckers." In addition there was a microscope evening with a good show of microscopes and a poor show of members. The inclement weather interfered with one or two expeditions, but there were

three successful outings, an ornithological ramble led by Mr. Glegg, in which 40 species were recorded, a visit to the Scoutmaster's H.Q. in Gilwell Park, and an afternoon ramble in the forest, all of which were thoroughly appreciated.

Much of the success of the Branch is due to the whole-hearted support given by the parent society and also to the full reports of the lectures inserted in the local paper, "The Walthamstow and Chingford Guardian."

A. G. HUBBARD, B.Sc., *Branch Chairman*.

E. SAMUELSON, *Branch Secretary*,

39, The Ridgeway, E.4.

NOTES ON THE FISHES OF THE LONDON DOCKS

By PERCY W. HORN

An extract from a paper on "Fresh Water Fishes of London," read before the Society on October 17th, 1922.

WITH the exception of a brief reference to the Surrey Commercial Docks, these observations apply to the docks which are situated in the Borough of Stepney, on the north side of the river Thames.

These docks consist of four square basins, connected with each other, and of sufficient depth to accommodate large ocean-going vessels. Their water supply is derived from the Thames in the usual manner through narrow entrances, and, as far as I can ascertain, no other supply, polluted or unpolluted, flows into them.

Seventy years ago Blakey, in his book on Angling, stated that the docks of London (he does not specify which docks) were a favourite resort of tradesmen anglers, and that bags of fifty pounds of Roach, Bream and Perch were sometimes captured by them. Unfortunately an accident, which resulted in the death of an angler, occasioned the withdrawal of the privilege, consequently very little reliable information concerning the fish has been since forthcoming. From time to time during the past ten years, vague reports, indicating that the fish were still there, reached me from dock labourers and officials, but I could not induce my informants to produce evidence in the form of specimens until the summer of 1921, when the abnormal heat was the means of bringing the fish to the surface, and thus afforded an interested friend the opportunity of procuring a nice series of specimens.

From the end of May, 1921, onwards, the following living specimens have been brought in to me. The majority of these were kept in captivity and exhibited for varying periods.

ROACH (*Leuciscus rutilus*).

ROACH-BREAM HYBRID.

BREAM (*Abramis brama*).

DACE (*Leuciscus leuciscus*).

CHUB (*Leuciscus cephalus*).

BLEAK (*Leuciscus alburnus*).

MINNOW (*Leuciscus phoxinus*).

GOLDFISH (*Carassius auratus*).

GUDGEON (*Gobio fluviatilis*).

PERCH (*Perca fluviatilis*).

PIKE (*Esox lucius*).

TROUT (*Salmo trutta* var. *levensis*).

EEL (*Anguilla vulgaris*).

STICKLEBACK (*Gasterosteus aculeatus*).

A few brief notes concerning the local habits and times of appearance, etc., of the species may be of interest.

ROACH.—Many specimens of all sizes brought in, May to August.

Examples of 1lb. in weight may be seen in the Docks. Roach, Roach-Bream, and Dace, are subject to the well-known fungoid disease.

ROACH-BREAM HYBRID.—Common, spring and summer. Largest specimen was 4 inches long.

BREAM.—One record, April, 1923, 4 inches long, diseased.

DACE.—Abundant on surface in warm weather. Average length 6 inches.

CHUB.—One record. Several half-inch fry taken with young Dace in the spring of 1914.

BLEAK.—Abundant on surface in hot weather.

MINNOW.—Three separate examples, summer 1921 and 1922. It should be noted that the Minnow usually inhabits clear, pure streams.

GOLDFISH.—Two specimens, 3 and $7\frac{1}{2}$ inches long. Probably escaped fish.

GUDGEON.—Approximately one dozen specimens brought in during summer. Large average size, one example measuring 7 inches.

PERCH.—Numerous specimens up to 7 inches long. They were plentiful in the cutting in New Gravel Lane, summer 1914.

PIKE.—Two small specimens, summer 1921. One 11 inches long, taken January, 1922.

TROUT.—A specimen 6 inches long was picked up in a dying condition on the sill at the Shadwell entrance, and brought to me, January 1922. It was somewhat thin, but otherwise healthy. It cannot be considered a resident species, but in all probability drifted down in a sickly condition from the higher reaches of the Thames, and was washed into the dock at high tide.

EEL.—Several specimens, small, spring and summer. One which escaped capture reported "as thick as a man's wrist."

STICKLEBACK.—*Aculeatus* is very abundant round the sides in April, May and June, when the conspicuously brilliant males construct their nests. The average size is large, adult females frequently reaching a length of $8\frac{3}{4}$ inches.

The condition of the fish taken in the Docks compares very favourably with those of other London waters. *Argulus foliaceus*, the external parasitic fish louse which infests the Regent's Canal fish, appears to be absent from the Docks. Occasionally bruised and fungus-coated fish are brought in. During the hot summer of 1921 numerous fish came to the surface in a sickly condition, and many succumbed, but the mortality was not so great as in the Surrey Commercial Docks on the other side of the river, where, I am informed, the dead were estimated in tons. This sickness and mortality may be ascribed to the abnormally hot weather which brought about, (a) de-oxygenation of the water and generation and liberation of foul gases from the bottom, and (b) excessive salinity consequent upon the high tides prevailing against the diminished flow of fresh water from the upper reaches of the Thames.

In June, 1921, before the effects of the drought were apparent, I was privileged to walk round two of the basins to the east of Old Gravel Lane. The Docks do not appear to be an ideal home for fish.

Shallows, with the exception of one neglected corner, and a small stretch beneath a staging, were conspicuous by their absence, and the only aquatic vegetation that I could perceive was a dense growth of silky green alga which coated the piles and woodwork. On that occasion I was able to identify four species of fish, all healthy and actively feeding, *viz.*, Perch and Roach (some of the latter up to 1 lb.) browsing round the piles, and Bleak and Dace hunting on the surface.

The questions naturally arise, are these fish resident, and do they breed in the Docks? We can safely assume the answers to be in the affirmative. Without doubt the fish originally came from the Thames, but the present condition of the river from Wandsworth (where Dace are occasionally caught) downwards precludes the possibility that the Dock fish casually come and go with the tides. The combination of fluctuating salinity, pollution, and suspended matter in the water outside forms an effectual barrier against immigrants from the higher reaches.

It may be argued that if the fish live in the Docks they are quite capable of existing in the river just outside, the water of the Docks being derived entirely from this source, but we must bear in mind two facts. First the degree of salinity of the Docks owing to the limited means of ingress and egress, is comparatively *constant*. Secondly, stationary water stored in open reservoirs becomes mechanically and chemically *purified*. On the occasion of the visit mentioned above I particularly noticed the clearness of the water, which was such that objects were discernable at a measured depth of six feet.

With regard to breeding, I have not been fortunate enough to record the spawning of any fish in the Docks other than the Sticklebacks, nor have I met with anyone who has witnessed the somewhat conspicuous amours of the *Cyprinoids*, but the appearance in May of myriads of tiny fry $\frac{1}{4}$ to $\frac{1}{2}$ inch in length and obviously not more than 1 month old is sufficient evidence to convince me that the fish do breed there. I have seen the young of the following, up to 1 inch in length:—Roach, Roach-Breain, Dace, Bleak, Chub, Minnow (1 example).

There is ample provision for the young fish by the time they have passed their infusoria-eating stage. At the end of May, water fleas (identified by Mr. D. Scourfield as *Daphnia major*) appear in the quiet corners in such incredible numbers as to colour the water. I find that the largest fish also devour these with avidity.

Very little appears to be forthcoming concerning the molluscs, crustaceans and plants of the Docks. I hope at some future date to furnish some information on these matters which have such an important bearing on fish-life.

A NOTE ON THE BIRDS OF TEXEL

By W. E. GLEGG, F.Z.S., M.B.O.U.

Read before the Society on May 2nd, 1922.

THE subject of this paper, among ornithologists, is probably a hackneyed one, as the district has been for many years one of the Meccas of those British bird-lovers who carry their study beyond the confines of our own islands, but, so far as I am aware, this is the first occasion on which this society has devoted an evening to this well-trodden island.

We chose the well-known route, *via* Harwich and the Hook, and then on to Amsterdam, *en route* for which we obtained some little idea of the beauty of the famous bulb fields. The next stage of the journey is from Amsterdam to Den Helder in the north of Holland. Between Amsterdam and Alkmaar the country is much suburbanised, but between this place and Den Helder it assumes a more rural aspect. A somewhat primitive and very little steamer carries one from this important naval base to the Haven of the Island, the picturesque Oudeschild. On this journey through Holland the most noticeable bird was the Starling which was seen everywhere, and Blackheaded Gulls were also common. Between Alkmaar and Den Helder the Magpie and a single Hooded Crow were seen, the latter species not being observed on the island, and my interest was enlivened by the appearance of a Spoonbill and a Harrier, species unknown to me.

The Island of Texel is the most southerly of the chain of islands which may be said to form a breakwater between the North Sea and Zuider Zee. Texel, which is about 73 square miles in extent and possesses 6,400 inhabitants, consists mainly of pasture land which supports a matter of 34,000 sheep, but various crops are grown quite successfully.

On the west the island is protected from the turbulence of the North Sea by extensive sand dunes almost mountainous in nature, and on the east by a superb stone breakwater, which is surmounted by an earthen wall and extends the whole length of the island. The natural barrier on the west and the artificial one on the east protect from the inroads of the sea several towns or villages which are the centres of the population, the capital being Burg, which is the hub of this insular universe and to which all roads lead. Den Burg is almost centrally situated on the island, a bus connecting it with the Haven, and it was here that we formed our headquarters.

We remained on the island from May 7th to June 2nd. The weather was remarkably fine and at times it was uncomfortably hot especially among the dunes, but on occasion it was decidedly cold.

A feature of the weather was the high visibility. It has to be remembered that the weather at this time was fine generally throughout Europe.

The next step is to try to form some idea of the natural features of the island from the aspect of the effect that they may have on the birds. It may simplify our description to say that there are four associations; there may be a fifth but of this I am not certain. Firstly we have the polder, that is, the reclaimed meadow land, which comprises four-fifths of the total area. It is completely flat, with sheets of water of varying size distributed over it and intersected with numerous dykes stretching out in all directions. There is, however, not far from Burg a small piece of rising ground which is covered with good trees. Apart from this the polder is almost devoid of trees, and there are very few bushes. This is the home of the wading species, such as Oyster-catcher, Terns, Godwit, Avocet, Plover, and those birds which find seclusion among the reeds which fringe the dykes.

Secondly comes the broad belt of sand dunes, which are to a large extent covered with growth, mainly heather and low bushes. This type of country is the haunt of the Harrier, Short-eared Owl, Curlew, etc. The third association is of artificial creation. The Dutch Staats boschbeheer which probably corresponds to our Dept. of Woods and Forests, has directed its attention to a strip of land between the sand dunes and the polder, several miles in length but not very wide, on the S.W. of the island. This has been planted chiefly with coniferous trees with a very thin strip of deciduous bushes. These pine plantations have already provided opportunity for ecological observation, having exerted a powerful influence in altering the character of the avifauna of the island, and it seems probable that these changes have only commenced. I do not know with what object this planting has been carried out, but I should imagine that it is mainly to shelter the polder from the strong westerly winds which sweep across the North Sea. Incidentally the trees have attracted many small birds such as Warblers, etc., most of which were previously unknown to Texel. The fourth division is the land, chiefly salting and extensive sand banks, which lies beyond the sea-wall and the dunes. This is frequented by many Waders, etc., probably non-breeding or migratory birds.

The possible fifth association is the shingle which lies outside the sand dunes. I have no evidence that there are any colonies breeding here, but I suspect one near Koog, probably Sandwich Terns, and Meinheer Burdett who does so much to protect the birds of Holland, mentioned in my presence that there was a new colony, but he did not seem to be especially anxious that I should know either where or what it was.

Birds are to be found all over the island, but there are five districts which are of outstanding interest because they house nesting colonies of one or more species, sometimes several, and are, as probably all important nesting colonies are in Holland, strictly protected. These five localities are situated at Koog and Westermient on the west, Nieuwland on the south, Waal in the centre of the island and

Oosterend on the east. The first two belong to the sand-dune association, the other three to the polder.

It might not be out of place to remark at this point that these colonies are a source of attraction. The Dutch take their natural history quite seriously, and during our stay many crossed over from the mainland with no other object than to see the birds. During a holiday season the hotel was crowded, and on another occasion we were asked to vacate the chief dining room so that it might be given over to a party from a girls' school under the guidance of a teacher. However there are drawbacks to this, as I fully realised when I saw this party assemble round a Shoveler's nest which was situated in long succulent grass. This nest was so well concealed that when I was putting up my tent I had to place the seat of my stool over it to avoid the risk of breaking the eggs. The visit of these seekers after knowledge rendered all such precautions very unnecessary.

Before proceeding to consider the birds of the different types of country as I have divided them, it may be advisable to say that there must be a certain amount of contradiction. That is to say that, although the chief habitat of a species is on one type of country, it may also be found nesting occasionally on another. For example, the Black-tailed Godwit is a bird of the polder, but its nest is occasionally found among the dunes.

The polder possesses many riches, but the colony at Waal is perhaps its brightest jewel, and here may be found the nest of most of the water-loving species which inhabit the island. For this reason, and also on account of its accessibility, I devoted most of my attention to the meadows at Waal-en-Burg where there is the largest piece of water on the island. It is called the Staart and is as interesting as it is large. The Staart is the holy of holies of the protected areas, and I never had the opportunity to set foot within its sacred precincts. The barbed wire which barred the progress of the intruder at points where the dykes failed to do so were reminiscent of war-time entanglements. On the Waal meadows nests are everywhere, and one must tread warily to avoid doing damage among the eggs of the Avocets, Black-tailed Godwits, Oyster-catchers, Lapwings, Kentish Plovers, Redshanks, Reeves, Black-headed Gulls, Common Terns, Shovelers, etc. The strong protective measures which have been adopted at Waal, were carried out in the interests of the Avocets, Godwits, Reeves, Kentish Plovers, etc., but matters have not worked out quite as expected, for the Black-headed Gulls have taken advantage of the protection and have become the predominating species. This bird is so well known to you that I need not say much about it, but the numbers that nest at Waal are very remarkable, and it was only when the enclosed area was approached and the Gulls alarmed that any idea could be formed of their abundance. Then the air would be darkened by a long dense cloud of birds, accompanied by the confused babel of their united voices. Their bulky nests were also numerous outside the enclosure.

I was much surprised when Bruin, the veldwachter, with his long vaulting pole a picturesque figure, on my first visit to Waal showed me



Photo. W. E. Hugg.

KENTISH PLOVER ON NEST, TEXEL.

(To face p. 24.)

a nest containing three eggs, which he endeavoured to make known to me belonged to the Strandplevier, which at the time did not make me much the wiser. The eggs to me seemed extremely like those of the Kentish Plover, but I was not aware that this bird was found on the island. However, it was not long before I was able to say that the owner of the eggs was the dainty little Kentish Plover. Now in England we associate this Plover with the extensive shingle banks of Lydd and the bird could have found a similar habitat at Texel. It preferred, however, to seek its nesting quarters among the grassy meadows, but there were manifest signs to indicate that this was really a bird of the sand and shingle. Here and there, where the sheep had worn off the grass, were bare sandy patches which were always used by the Kentish Plover for nesting purposes, the three eggs, somewhat smaller and decidedly darker than those of the Ringed Plover, being well protected, as they harmonised with the sheep excrement scattered over these sandy patches and were difficult to find.

At Lydd no nest seems to be made, the eggs being deposited in a depression in the shingle, but at Waal the bird devotes more attention to the safety of its eggs. Evidently a hollow is first scraped on the sandy soil and then quite a considerable nest of fine roots is built inside this, and each egg is sunk into the material so that the egg may be said to have its separate matrix. Whether this is obtained by the bird sitting on the eggs and pressing them down into the nesting material or by building in fresh material after the eggs are laid, I cannot say definitely, but I am inclined to favour the latter. However, I have no hesitation in saying that the Plover takes these precautions designedly to prevent the eggs being blown away by the high winds to which the island is subject.

Some hours in the hiding tent supplied further evidence that this Plover is really a shore bird. The nest was situated on one of the sandy patches which was long and narrow. The bird was not inclined to sit close enough for my photographic purposes and thus made many journeys to and from the nest. I noticed it always landed on the sandy patch and never on the grass. It would run past the tent, and when it reached the limit of the bare patch it would either turn or fly away, and on all occasions when I was able to see it after doing the latter, it alighted on another sandy patch. I saw several nests and the description I have given is applicable to all.

Of the nests found on the meadows there might be said to be two types, closed and open. The Reeve, Redshank and Shoveler use nests of the former type while the Lapwing, Black-tailed Godwit, Avocet and Mallard have open nests. The Black-tailed Godwit was one of those species which for obvious reasons were of especial interest to me, and on the day after my arrival I was very pleased to make my acquaintance with it at the Staart, and its identification was by no means difficult. The Godwit with its long legs and bill is a striking bird. On the wing it flies with its feet extended beyond its tail, which gives it the appearance of having two elongated central tail feathers, and its note is one of the features of the meadows, for it is very noisy on the wing,

frequently uttering its loud notes *tu-ee-too* or *grutto*. A number of nests were found, all among the grass, the four eggs being laid in an open nest.

The Ruff was a bird which I had expected to find of especial interest, and I was in nowise disappointed. The birds of Europe are a big question, but does the continent possess anything more extraordinary than this grotesque bird? I do not know the origin of the term "hilling of the Ruffs," but I must confess that I was misled to some extent, for I had certainly associated this performance with an elevation of the ground. On Texel the "hill" of the Ruffs is as flat a piece of ground as could be imagined. The one at Waal was situated about a dozen yards from the road, but it could not be directly approached on account of the dykes. It was placed on a narrow piece of ground covered with long grass between two dykes, and may have been four yards square in extent. So closely do the birds confine themselves to this pitch that the ground is worn quite bare. The performance described as hilling could be easily observed at any time from the road. About a dozen Ruffs frequented the hill, and they always seemed to be there or near from sunrise to sunset. At times they might be seen on the sandy road. I have seen them in the early morning and in the evening.

The whole effect of the performance is somewhat ludicrous. The habits of the hill, with their wonderful ruffles and head pieces springing at right angles from the side of the head, stand roughly in a circle. Then two birds suddenly spring into the air at each other. This may be repeated several times and perhaps end in one or both of the birds taking to flight. To describe this as fighting is an exaggeration; sparring is a better word. A female may or may not be present during such displays. Another extraordinary feature of this bird is that no two males seem to possess the same colour pattern of plumage, and this polymorphism gives rise to some interesting biological questions. Is there a definite number of plumage forms which are constant, which are inherited? In other words are there certain strains of Ruffs? The females, Reeves, are all alike in plumage and might easily be mistaken for a Redshank. It must not be forgotten that out of the breeding season the males possess similar plumage to the females.

As already mentioned the nest, in which four eggs are laid, is completely covered and very difficult to find. The Reeve is very faithful to her nest, and this may be due to the fact that the male takes no part in the incubation. My experiences with one nest will support this. I have had to walk right up to the nest before I disturbed the sitting bird. Then she would run away a short distance pretending to be injured. The following are my notes made in the tent whilst trying to photograph her:—"In a few minutes she was wandering round in the grass apparently feeding but really inspecting the tent. She soon approached the nest and disappeared through the entrance lane. After the second exposure she settled down, occasionally pushing her head above the grass to inspect the situation. No noise,

shouting or hammering on a metal shutter, or waving a pencil, finger or handkerchief through a hole in the tent would shift her. Finally I tied the handkerchief to a piece of string, pushed it through the hole and allowed it to float towards the nest which she then left, but she was back again in a few minutes. I never heard either Ruff or Reeve utter any sound."

The Black Tern was the only bird which gave me reason for disappointment. Many of this handsome species were seen at Waal where they nest annually, but I was unfortunate as I did not see the eggs. For some unknown reason these Terns were unusually late in nesting in 1921.

So far as I can ascertain the Black Tern appears to be a freshwater species. At Texel it nests on the meadows, but usually the nest is a floating structure, and at the Naardermeer it is stated to nest on the leaves of aquatic plants. These Terns might usually be seen hovering low down over a dyke, or at other times hunting over the meadows where they evidently obtained a considerable part of their food. The note is described as *crick, crick*, but to my ear it sounded like *irrah*.

The Shoveler was fairly common at Waal. I saw two nests, both placed in the long grass, one with nine and the other with ten eggs. This duck nested chiefly inside the enclosure, but no doubt there were many more outside than we were aware of, as they are very well concealed. The nests were thinly lined with down interwoven with fine rootlets. From my experiences in the tent, I would say that the Shoveler among birds possesses intelligence above the average. I spent a whole morning in the tent, but the bird would not come near the nest. To eat my lunch I went some distance from the tent, and on my return flushed the duck from the nest. I have no hesitation in saying that this duck can count up to two, for my wife came to the tent with me on each occasion, leaving it after fastening me in. I imagine that the Shoveler was hidden in a dyke from which she could watch me in and out of the tent. I observed that each time the duck was flushed from its nest it splashed the eggs with excrement, and this no doubt is done with the object of protecting them.

Among the other species nesting in this colony the Lapwing and Redshank were well represented. The nests of the latter were all closed. The Common Tern nested freely, the nests being placed on the short grass. However, of the wading species the Oyster-catcher is the most characteristic bird of the polder, being common everywhere, and many nests were found. The Scholekster, as the Dutch call it, is stated to be much addicted to taking the eggs of the other birds. Among the reeds along the dykes Moorhens nested, and Coots inside the enclosure.

Oosterend does not possess any striking feature, but the colony contained a large number of nesting birds including Lapwings, Redshanks, Oyster-catchers, Avocets, Kentish Plovers, Black-headed Gulls, and Common and Lesser Terns. The last named was not found nesting anywhere else. An interesting object was pointed out to me here. It was a square hole dug in the ground and named Selous's

castle. He had this hole dug out and covered over so that he might spend the night in it with the object of hearing the call of the Ruff.

Nieuwland is probably the most attractive of the colonies because it constitutes the headquarters of the beautiful Avocet. It is situated at the southern end of the island. Here, just inside the sea-wall, is a small shallow meer dotted with tiny islets. Close to the meer is the old-fashioned cottage of the Keeper, the whole effect being picturesque. I estimated that there were about thirty pairs of Avocets nesting here, but I was informed that at one time there were many more. The tiny islets were used by the Avocets for nesting purposes, but many nests were scattered all round the meer, some of them quite close to the water. Most of the nests contained four eggs. A number of Avocets wading about in the shallow water completed a striking picture.

Avocets nest at various points of the island and most of my experience of the species was gained at Waal, but as Nieuwland is the chief nesting place and also a suitable setting for such a beautiful bird, I deferred its consideration until now. At Waal and Nieuwland very little material was used, but at Oosterend the nests were very bulky. The only reason that I can suggest for this is that at the latter place there might be a risk of flooding.

The Avocet is by no means a noisy bird, but when it does call, the note is a strong clear "klweet." Although it is a bird of a confiding nature, it can be very resentful when its nest is approached, and will fly in quite a savage manner straight at the face of the intruder, rising above his head when within striking distance. It is a more than pleasing sight to see an Avocet shuffling away from its nest by trailing leg and wing.

At Oosterend on May 27th, I saw a nest with eight eggs. The Keeper by signs and words indicated that this was not the work of human agency. If this was so, then two birds must have laid in the one nest. At the same time I also saw a nest with three eggs and one young bird, just hatched. It was noticeable that the legs were bluer than in the adult, that the bill, which was slightly recurved, carried the nail, and that the youngster was able to walk. I could find no traces of the eggshell.

Of the other birds nesting at Nieuwland the most noticeable were the Common Terns, which shared with the Avocets the tiny islets as nesting places, a few Black-headed Gulls and a considerable number of Mallards.

The characteristic birds of the polder are the larger aquatic species, but certain passerine birds are also closely associated with this type of country. Starlings are very numerous, and, although I have no proofs, I think they must nest on the ground. Reed Bantings, Reed Warblers and an occasional Sedge Warbler frequented the reeds. Skylarks and Meadow Pipits were abundant, and Wheatears, Swallows and Sand Martins were fairly common. I used to wonder where the last named nested, and I think that the turf walls which separate the fields may have been used. Another small bird met with regularly was the Tree-Sparrow. Of all the smaller birds there were two which we found of

special interest, the Blue-headed Wagtail which was everywhere abundant on the polder, and the Icterine Warbler which was nearly always found at suitable places. Like other Warblers this is a skulking species, but when with patience we finally get a view of the bird we find that it may be described as possessing light olive green upper parts, with pronounced superciliary stripe, under parts of a light greenish yellow, and legs slate. The song is diagnostic. It usually opens with loud and somewhat unmusical notes, almost Starling-like and very distinctly nasal. At intervals the harsh Sedge Warbler notes are introduced. The main part of the song is very musical, quite equal to, and at times difficult to distinguish from, that of the Garden Warbler.

The egg of the Icterine Warbler is especially beautiful being of a fine pink colour. I was shown one taken on the island in a previous year, and was informed that they were much more beautiful when newly taken from the nest.

The wild nature of the dunes was a striking contrast to the flatness of the polder. These miniature highlands provided a suitable home for the birds of a wilder nature, and on most of my visits I saw Montagu's Harrier, but they were very shy and it was rarely that I got near to them. On becoming aware of the presence of a human being they would soar aloft to a great height. This Harrier is really common, and I am informed, nests freely. On May 30th I saw two nests of this species, the pure white eggs, five in number on each occasion, were in nests built of dried grass. The nests were placed among some low bushes and were quite unconcealed. One bird was sitting so closely that a member of the party almost walked on to it before it quitted the nest.

The Short-eared Owl I only saw once when I flushed a bird from some deep heather, and I never saw any nests, but Meinbeer Burdett knew of a nest which he photographed. The Rev. H. N. Bonar, who was staying at the same hotel, related to me how, when he was photographing the nest of this Owl, the bird attacked him and inflicted some disagreeable wounds, and he was only able to get rid of his assailant by throwing his focussing cloth over it. On returning to the hotel and relating his experiences, a member of the party was sceptical and insisted on visiting the nest to see for himself. He returned with his felt hat completely destroyed.

The most familiar sound among the dunes was the wailing cry of the Curlew. They always seemed to be on the watch, and when the solitude of their haunts was broken they sounded what must have been a general alarm. The Curlew was common and nested.

A visitor to the hotel had surprised me by saying that Kestrels were nesting among the heather on the dunes—no, not Merlins. On May 25th I got into touch with the keeper who, leading me across some difficult ground, showed me three hawks' nests, two with six eggs and one with four. These nests were placed amongst deep heather, no material being used, the eggs resting on the loose peaty soil. One of the nests contained a number of pellets. Just beyond this nest on a

dried-up swamp there was a Curlew's nest with two eggs, and beyond this again a Black-tailed Godwit was sitting so closely on its nest that I was able to expose a plate on it without the bird making the slightest movement.

Near here is what I have described as the Westermient colony, where a considerable number of Herring Gulls carry on nesting operations. There is not much growth here and the nests, composed of a mass of material, are placed on the sand. There are about fifty nests in all, and one nest with three eggs had one remarkably small egg.

The most striking feature of the dunes was the Koog colony. In the midst of some of the highest dunes lies a meer of considerable size with a large reed-bed. The ground, so closely covered with prickly bushes as to be almost impenetrable, slopes down in all directions towards the lake, enclosing it and forming a natural amphitheatre, the whole effect being that of a wild solitude. Although there are exceptions in this country, the Heron is looked upon as a tree nester, but on Texel it has chosen this reed bed in which to place its nest. When I visited this colony on May 20th, Heron after Heron arose from the seemingly tenantless reed bed until there were fully thirty in the air. With the Herons arose two large white birds, but, unlike the Herons, with neck and legs fully extended; they were Spoonbills and the first pair to have been recorded as nesting successfully on the island for many years. Ten years previously a pair nested, but their eggs were taken. I was informed that the Bittern also nested here, but I did not identify this species. I also saw what I believed was a Marsh Harrier flying over the lake, on which were several Shelduck and Pochard and one or more Garganey. On a long dyke running through the dunes a Teal with young was flushed.

The Cuckoo seemed to find victims more easily on the dunes than on the polder, for it was much more often found on the former than the latter. The Whinchat might usually be seen delivering his cheerful song from the tops of the low bushes which sheltered nesting Pheasants.

The coniferous plantations do not call for a lengthy consideration, but there can be no doubt that they are exercising a gradually increasing influence on the avifauna of the island. An occasional Warbler might be heard at different parts of the island, and among the bushes round the duck decoys, but there can be no doubt that the now considerable population of songsters owes its existence to this factor. Among the species found among the firs were Whitethroats, Lesser Whitethroats, Garden Warblers, Willow Warblers, Icterine Warblers, Redstarts, Linnets, Greenfinches, Chaffinches, Hedge Sparrows, Wrens, Song Thrushes, Blackbirds, Turtle Doves, etc. The Magpie also seemed to find congenial quarters here.

The fourth association provided very interesting experiences although I was unable to devote much time to observation there, and it is highly probable that more attention to this part of the island would have added to the list of birds observed. To the south of Cocksdoorp,

which is at the extreme north of the island, there is a long stretch of saltings and farther out extensive sand-banks. Here on May 26th, while on a tramp round the sea-wall, I came across the greatest congregation of wading species that it has been my fortune to see. Rising out of the shallow water was what appeared to be an extensive reed-bed or mud-bank, but on closer inspection it proved to be a vast concourse of birds. I estimated the numbers in thousands, and so many were there and so close together that, when they rose on my approach, it seemed as though their wings must come into contact. Of what species this great flock was composed I cannot say, as the birds were just beyond the range of my glasses, but there were many closer in and among these were Bar-tailed Godwits and Golden and Grey Plover. The two species of Plover were in full breeding plumage, which is very striking, especially that of the latter. Gathered together on a sand-bank was a flock of Oyster-catchers which I estimated contained about five hundred birds. I can only imagine that these were non-breeders. Other species to be mentioned here are the Green Sandpiper, Ringed Plover and Cormorant. There were also many immature gulls.

Having dealt with the four chief types of country, a few remarks of a general nature may not be out of place. The Corvidae were badly represented. There were one or two Carrion Crows at Burg, perhaps nesting in some trees in the town, and I heard the Jackdaw there occasionally. The Rook, I think, I only saw once. I identified the Crested Lark, but I did not pay sufficient attention to it to give any idea of its status. Tits were remarkably scarce, one species only being found, namely the Great Tit and that was not common. The Swift I only saw once, and Martins were scarce, one or two pairs nesting in Burg. In the little wooded elevation near the capital, the Tree-creeper and Spotted Flycatcher were noted.

All that remains is to mention some unusual occurrences. The Stork does not nest on the island, but I saw a single bird. A Great Crested Grebe, probably nesting, was seen repeatedly on the Stuart. Two Dotterel (*Charadrius morinellus*) were seen near Koog on May 20th. The Common Gull was seen on the east of the Island, and I was afterwards informed that one or two pairs nest there. And probably what was my most interesting record, I heard the Nightingale singing on May 14th. I was told that the Nightingale had never been identified on Texel before 1921, but this is probably a mistake, for, although it is a very rare occurrence, it appears to have been previously recorded.

During my stay on Texel I identified 83 species, which probably gives a fairly good idea of what may be seen, as Ticehurst in his list published in the "Ibis" mentions 144 species.

In spite of the fact that the number of ducks has decreased, there are still decoys actively working, and I was permitted to visit one. It possessed four roughly constructed pipes which were hidden by ash, rowan and sallow bushes. I was informed that the ducks chiefly taken were Mallard, Wigeon, Teal, Garganey and Shoveler. The Mallards fetched 1s. 8d. each and the others somewhat less.

Interesting as Texel still is from the bird point of view, it is now only a shadow of what it once was. At one time eggs were so numerous that they were collected and sent to Amsterdam, and Burdett told me that even in his time the islanders collected them by the pailful and gave them to their pigs. The northern portion of the island is still called Eijerland, that is "land of eggs."

THE BIRDS OF EPPING FOREST

SEVENTH ANNUAL REPORT

NO additions were made to our list during the year, the total of recorded species remaining at 96. Members and correspondents assisting us in this work are thanked for their help, and further records are invited to be sent, as heretofore, to the Secretary of the Ornithological Section, Mr. S. Austin, 48, Darent Road, Stamford Hill, N.16.

CARRION CROW (*Corvus corone*).—Observed every month except June. March 5th, two nests apparently in use on island, Connaught Water; April 9th, nest on oak tree by pond on Fairmead Bottom. September 8rd, one seen being mobbed by a great number of swallows and martins. October 22nd, three parties of 6, 6 and 14 passed over Chingford Plain.

JACKDAW (*Corvus monedula*).—Frequently recorded. Nest could be seen in tower of High Beach Church, May 4th.

ROOK (*Corvus frugilegus*).—Recorded for every month except November. The Wanstead Park Keeper drew attention to the scarcity of nests in the park in the spring, there being not more than about two dozen, although at that time there were thousands of birds present. It is thought that owing to the repeated destruction of their nests for some years past (in order to afford protection to the herons), the rooks have chosen a place for their nesting in another locality.

BRITISH JAY (*Garrulus glandarius rufitergum*).—No diminution in numbers. On April 2nd, at Ludgate Plain, one was watched and heard imitating the raucous note of the crow; on April 9th, at Chingford Wood, another was heard giving the "keewick" call of an owl; and on April 23rd, at Long Hills, another repeated the cry of the little owl. Nest found, May 20th, by Mr. C. E. Baker, copiously lined with black horsehair. Nest was deserted and contained 4 eggs (see "British Birds," vol. xvi., p. 47).

STARLING (*Sturnus vulgaris*).—No apparent increase. May 28th, three pairs found using old woodpeckers' holes for nesting.

GREENFINCH (*Chloris chloris*).—On March 12th, in Connaught Wood, a large flock of this species and chaffinches were calling and singing, producing a remarkable volume of sound, a veritable chorus. On October 29th, December 3rd and 24th, seen feeding on hornbeam seeds.

HAWFINCH (*Coccothraustes coccothraustes*).—Seen from January to May at Highams Park, Chingford and Hawk Woods, Long Hills, Debden Slade, and Old Church Plain.

BRITISH GOLDFINCH (*Carduelis carduelis britannica*).—November 26th, Highams Park.

SISKIN (*Spinus spinus*).—April 29th, two in birches, near Strawberry Hill Pond; November 26th, Highams Park.

HOUSE SPARROW (*Passer domesticus*).—On October 29th, Leyton Flats, large flock feeding among grass.

TREE SPARROW (*Passer montanus*).—February 5th, Sewage Farm, Chingford Hatch; April 28rd, Chingford Wood.

CHAFFINCH (*Fringilla coelebs*).—Recorded throughout year. Heard in full song, February 19th, Chingford Plain. Nest found, April 28rd, Chingford Wood.

BRAMBLING (*Fringilla montifringilla*).—More numerous than usual. Seen during November and December at High Beach.

LINNET (*Acanthis cannabina*).—April 23rd, High Beach; May 7th, singing as it flew across Chingford Plain; August 18th, Warren Hill.

LESSER REDPOLL (*Acanthis linaria cabaret*).—During January and February, and November and December, seen at Highams Park, Turpin's Hollow, High Beach, and Loughton Camp.

BRITISH BULLFINCH (*Pyrrhula pyrrhula pileata*).—Well recorded. January 15th, ♀ seen and heard to "pipe" during flight, Buttonseed Corner. July 16th, High Beach, young birds seen.

YELLOW HAMMER (*Emberiza citrinella*).—Recorded chiefly from Warren Hill and Plain, from March 12th to October 1st.

REED BUNTING (*Emberiza schoeniclus*).—Much scarcer. Only recorded on January 15th, near Fox Earth, Green Ride, Theydon Bois.

SKYLARK (*Alda arvensis*).—Recorded from the various plains.

PIED WAGTAIL (*Motacilla lugubris*).—Recorded from Hatch Plain, Bell Common, Connaught Water, High Beach, Warren Hill and Plain, Chingford Plain, Wanstead Park, and Leyton Flats.

GREY WAGTAIL (*Motacilla boarula*).—Seen on January 8th, 14th, 15th and 21st, and February 5th and 12th, at Hatch Plain.

TREE PIPIT (*Anthus trivialis*).—As common as usual. Song first heard on April 14th, at Woodridden Hill.

MEADOW PIPIT (*Anthus pratensis*).—January 15th, Hatch Plain; April 9th, Whitehall Plain (3), Yardley Hill (2); November 12th, Leyton Flats (3).

BRITISH TREE-CREEPER (*Certhia familiaris britannica*).—Position maintained.

NUTHATCH (*Sitta caesia*).—Well recorded from January to May, and November and December. Nest in Hill Wood, May 14th; and young reared near top of Bridle Path, Woodford.

GOLDCREST (*Regulus regulus*).—Recorded during February, March, November and December.

BRITISH GREAT TITMOUSE (*Parus major newtoni*).—Recorded throughout year.

BRITISH COAL TITMOUSE (*Parus ater britannicus*).—Again well recorded.

BRITISH MARSH TITMOUSE (*Parus palustris dresseri*).—Well recorded.

BRITISH BLUE TITMOUSE (*Parus caeruleus obscurus*).—Common. June 11th, Hawk Wood, nest in ash tree; July 23rd, Buttonseed Corner, party of young.

BRITISH LONG-TAILED TITMOUSE (*Aegithalus caudatus roseus*).—In average numbers.

RED-BACKED SHRIKE (*Lanius collurio*).—First seen, May 9th, Fairmead. Young observed, July 23rd, Warren Plain and Fairmead Bottom; August 6th, Old Church Plain; August 18th, Warren Plain; August 19th, Fairmead.

WHITETHROAT (*Sylvia communis*).—First seen, April 19th, Fairmead. July 16th, Warren Hill, several feeding young.

LESSER WHITETHROAT (*Sylvia curruca*).—In fairly good numbers. First seen, May 6th, Fairmead.

GARDEN WARBLER (*Sylvia simplex*).—In usual numbers. First observed, May 6th, back of "Robin Hood."

BLACKCAP (*Sylvia atricapilla*).—Appeared to be more numerous than for several years past. First seen April 23rd, Long Hills. On May 7th, ♂ heard singing and at same time carrying grass bents in his beak.

WILLOW WARBLER (*Phylloscopus trochilus*).—As numerous as ever. First observed, April 13th, near Strawberry Hill Pond.

WOOD WARBLER (*Phylloscopus sibilatrix*).—Probably increasing. First heard May 6th.

CHIFFCHAFF (*Phylloscopus collybita*).—Numbers as usual. First seen, April 13th, near Strawberry Hill Pond.

MISSAL THRUSH (*Turdus viscivorus*).—Numbers well maintained. On April 9th, in Hill Wood, one was singing strongly and on flying off still continued to sing in flight.

BRITISH SONG THRUSH (*Turdus philomelos clarkii*).—Common. On September 17th, at Long Hills, party of about a dozen feeding on sloes and haws.

REDWING (*Turdus musicus*).—Last seen in first part of year on February 5th. The first bird of the new migration was seen on October 8th, at Long Hills, and thereafter the abundance of this species was a striking feature of the woodland.

FIELDFARE (*Turdus pilaris*).—February 12th, Highams Park and Hatch Plain; November 23th, Highams Park; December 3rd, Long Hills.

BLACKBIRD (*Turdus merula*).—Observed throughout year, with increased numbers during winter months.

REDSTART (*Phoenicurus phoenicurus*).—Frequently recorded. First date, April 19th; last date, September 16th.

BRITISH REDBREAST (*Erithacus rubecula melophilus*).—Abundant. June 11th, Hawk Wood, feeding young. August 2nd, bird of the year quietly singing in small bush.

COMMON NIGHTINGALE (*Luscinia megarhyncha*).—More common than usual. First seen, April 19th. On July 16th, at Connaught Water, two seen with food in beaks.

WHINCHAT (*Saxicola rubicola*).—May 6th, near "Forest Hotel," 2 males; May 9th, Fairmead.

WHEATEAR (*Oenanthe oenanthe*).—On May 7th, near "Forest Hotel," first seen on ground; then it perched high up in an oak tree.

HEDGE SPARROW (*Prunella modularis*).—Better recorded. Young seen, July 28rd, at Buttonseed Corner.

WREN (*Troglodytes troglodytes*).—Abundant.

SPOTTED FLYCATCHER (*Muscicapa striata*).—May 14th, Hill Wood; August 6th, Old Church Plain; two or three pairs with young seen near Bridle Path, Woodford.

SWALLOW (*Hirundo rustica*).—First seen on April 18th, flying over Strawberry Hill Pond; last seen on October 1st, over Chingford Plain. On September 8rd, seen with Martins in striking numbers over Chingford and Warren Plains—no doubt a migrational movement. Nested in a pavilion near the "Forest Hotel."

MARTIN (*Delichon urbica*).—June 6th, Wanstead Park; on September 8rd, in company with the last species, seen in striking numbers on Chingford and Warren Plains; September 17th, Warren Plain (party), Chingford Plain.

SAND MARTIN (*Riparia riparia*).—June 5th, Wanstead Park, two flying over "Shoulder of Mutton" Pond.

BRITISH GREAT SPOTTED WOODPECKER (*Dryobates major anglicus*).—June 11th, Hawk Wood. Nest in ash tree—young heard "chanting." June 17th, Chingford Wood. Nest with young. August 18th, Warren Hill. Young bird seen. Adult bird seen and heard during most months of the year.

LESSER SPOTTED WOODPECKER (*Dryobates minor*).—Identified at Highams Park, Hill Wood, High Beach, Chingford Wood, Barn Hoppit and Leppit's Hill. A pair nested within 100 yards of the White Cottage, Bridle Path, Woodford.

GREEN WOODPECKER (*Picus viridis*).—Well recorded throughout year.

CUCKOO (*Cuculus canorus*).—Not so well recorded as usual. First heard on April 18th.

SWIFT (*Micropus apus*).—First seen May 14th; last appearance August 12th.

NIGHTJAR (*Caprimulgus europaeus*).—May 9th, Clay Ride, where it remained throughout the summer months; May 27th, Strawberry Hill; May 29th, flushed several times during early evening from the Black Bushes, later heard "churring."

KINGFISHER (*Alcedo ispida*).—February 5th and 19th, Connaught Water; February 25th, Wanstead Park; at Big Hill Pond throughout October; December 8rd, Connaught Water.

BARN OWL (*Tyto alba*).—February 5th, Sewage Farm, Hatch Plain, at 10.45 a.m., mobbed by a flock of finches and tits.

TAWNY OWL (*Stria aluco*).—May 7th, Chingford Plain; May 18th, Peartree Plain; September 16th, Blackbush Plain (noon).

SPARROW HAWK (*Accipiter nisus*).—January 8rd and 4th, Fairmead; April 2nd, Yardley Hill.

KESTREL (*Falco tinnunculus*).—January 1st, Warren Plain; January 15th, Connaught Water; April 2nd, Whitehall Plain; December 10th, Fairmead Bottom.

MUTE SWAN (*Cygnus olor*).—Recorded from Connaught Water and Highams Park.

MALLARD (*Anas boschas*).—Recorded every month of the year except August; chiefly in flocks during winter, one of 48 on ice, Connaught Water, January 7th; June 5th, Wanstead Park, duck with 9 young in down; June 11th, Warren Pond, three broods; July 16th, Connaught Water, two broods, both of 6.

TUFTED DUCK (*Nyroca fuligula*).—April 2nd and November 26th, Highams Park. Attention was drawn by the Keeper to the extra large number of birds of this species during the winter in Wanstead Park.

HERON (*Ardea cinerea*).—February 25th, Wanstead Park, birds at nests; March 12th, 18 nests counted in Wanstead Park, 15 of these had either one or two birds standing on or near them, whilst there were several other birds perched in the surrounding trees; May 7th, flying over Long Hills; May 7th, one flew over Fairmead in direction of Walthamstow Reservoirs; May 18th, one flew over High Beach, going eastwards. Mr. F. F. McKenzie reported that there were 61 nests in the spring in the Wanstead Park Heronry and that there was a very fair hatch-out of young birds.

WOODCOCK (*Scolopax rusticola*).—March 14th and December 20th, Fairmead; October 21st and 25th, in swampy ground by side of Clay Ride.

LAPWING (*Vanellus vanellus*).—January 3rd, seven seen on Fairmead.

BLACK-HEADED GULL (*Larus ridibundus*).—October 29th, Leyton Flats, 18 on "Green Man" Pond, and 2 on boating lake.

LITTLE GREBE (*Podiceps ruficollis*).—June 5th, Wanstead Park, one on "Shoulder of Mutton" Pond.

MOORHEN (*Gallinula chloropus*).—Recorded throughout year on Connaught Water, Highams Park, Wanstead Park, Leyton Flats and Bell Common.

COOT (*Fulica atra*).—March 12th, Wanstead Park.

RING DOVE (*Columba palumbus*).—Well recorded, except during summer. On January 15th, about 250 seen in Highams Park; on March 12th, in Wanstead Park, no less than 63 were counted busily feeding on buds of trees between rookery and heronry.

TURTLE DOVE (*Streptopelia turtur*).—May 13th, Long Hills.

PHEASANT (*Phasianus colchicus*).—February 19th, Strawberry Hill; April 23rd, Magpie Hill, Hill Wood; May 14th, Ludgate Plain; November 26th, Epping Thicks.

PARTRIDGE (*Perdix perdix*).—February 19th, Warren Plain.

LIST OF MEMBERS

It is particularly requested that Members will inform the Secretary as soon as possible of any change of address

HONORARY MEMBERS

Grant, G. F., Beaumont Manor, Wormley, Broxbourne, Herts. (Arch.)
Massey, Herbert, M.B.O.U., F.E.S., Ivy Lea, Burnage, Didsbury, Manchester. (Lep., Orn., Ool.)

MEMBERS

Adkin, R., F.E.S., "Hodeslea," Meads, Eastbourne. (Lep.)
Aldred, Miss M., Flat 5, 21, Ladbroke Gardens, Notting Hill, W.11. (Orn.)
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Aris, E. A., 9, Oak Avenue, Priory Road, Hornsey, N. 8. (Lep.)
Austin, S., 43, Darent Road, Stamford Hill, N. 16. (Orn., Arch.)
*Battley, Mrs., 6, Craven Avenue, West Ealing, W. 13.
Bayne, Charles S., "Hill Rise," Paddockhall Road, Haywards Heath, Sussex. (Orn.)
Beattie, W., 8, Lower Grosvenor Place, S.W. 1. (Lep.)
Bell, William H., "Hillcrest," 74, Sylvan Avenue, Wood Green, N. 22. (Lep.)
Biddiscombe, W., 60, Maybury Road, Woking. (Bot.)
Bishop, E. B., "Lindfield," Marshall Road, Godalming. (Bot., Arch., Plant Galls, Orn.)
Blount, S., 40, Woodhurst Road, Acton, W. 3. (Arch.)
Blum, Victor, 23, Valentine's Road, Ilford. (Lep.)
Bradley, S. W., 5, Monkham's Avenue, Woodford, Essex. (Lep., Chem., Ast.)
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Braithwaite, Miss N. A., 18, Warren Road, Chingford, E. 4.
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Burkill, H. J., M.A., F.R.G.S., 3, Newman's Court, Cornhill, E.C. 3. (Plant Galls, Lep., Bot., Geol., Orn.)
Burrows, Rev. C. R. N., The Vicarage, Mucking, Stanford-le-Hope, Essex. (Lep.)
Butler, E. O., 60, Sutton Court Road, Chiswick, W. 1. (Ent.)
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Capleton, J. H., 75, Queen's Road, Leytonstone, E. 11.
Chapman, E., 219, Harlesden Road, N.W. 10. (Arch., Geol.)
Clark, J. W., "Hazeldene," 10, The Ridgeway, Chingford, E. 4. (Bot.)
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Cooper, B., 103, Bethune Road, Stamford Hill, N. 16. (Lep., Bot.)
Crabtree, B. H., F.E.S., "Hollybank," Alderley Edge, Cheshire. (Lep.)
Cyriax, R. C., 23, Aberdare Gardens, West Hampstead, N.W. 6. (Arch., Aryan question, Indo-European languages.)
Dallas, J. E. S., 38, Richmond Road, Islington, N. 1. (Orn., Bot.)
Daniell, V. W. L., 69, Talbot Road, Highgate, N. 6.
Davis, E. J., M.I.Mech.E., "Fillebrook," Loughton, Essex. (Orn.)
Davis, H. J., 42, Pembury Road, Clapton, E. 5. (Orn.)

- Dell, F. G., "The Hut," Russell Road, Buckhurst Hill, Essex. (Pond life, Micr., Orn.)
- Digby, D. E., "Keneric," Monkham Avenue, Woodford Green. (Bot.)
- Douglas, J., "The Maples," Alvaston, near Derby. (Lep.)
- Edelsten, H. McD., F.E.S., "The Elms," Forty Hill, Enfield, Middlesex. (Lep.)
- Eynon, Lewis, B.Sc., F.I.C., "Fernleigh," Hall Lane, Upminster, Essex. (Chem.)
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- Gardner, J. E., "Clive," Hengistbury Road, Southbourne, Bournemouth. (Lep., Bot.)
- Gaze, W. E., 10, The Avenue, Highams Park, Chingford, E. 4. (Lep., Bot., Chem.)
- Gerrard, V., 59, Campden Hill Court, Campden Hill Road, Kensington, W.8. (Lep.)
- Glegg, W. E., F.Z.S., M.B.O.U., The House, Albion Brewery, Whitechapel Road, E. 1. (Orn.)
- Glegg, Mrs., The House, Albion Brewery, Whitechapel Road, E. 1. (Orn.)
- Greenwood, M., M.R.C.P., M.R.C.S., "Hillcrest," Church Hill, Loughton, Essex. (Arch., Biol.)
- Grinling, C. H., B.A., 71, Rectory Place, Woolwich, S.E.18. (Bot.)
- Hall, L. B., F.I.S., 28, Station Road, Winchmore Hill, N. 21. (Bot., Galls., Biol., Geol., Micr.)
- Hanbury, Frederick J., F.I.S., F.E.S., Brockhurst, East Grinstead. (Bot., Lep.)
- Hanbury, F. Capel, Hoddes Hall, Hoddesdon. (Lep.)
- Hanson, P. J., "Burrcroft," Village Road, Bush Hill Park, Enfield. (Orn. Arch.)
- Hardiman, J. P., C.B.E., 1, Chatsworth Road, Brondesbury, N.W.2. (Orn.)
- Harding, J. Rudge, 34, Elm Park Mansions, Park Walk, S.W.10. (Orn.)
- Harvey, F. B., "The Nook," Rhodes Minnis, Elham, Canterbury. (Lep.)
- Heath, G. H., M.A., 5, Roughdown, Boxmoor, Herts. (Lep.)
- Hobson, G. D., Christ's College, Cambridge. (Lep.)
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- Howard, D. Lloyd, J.P., F.I.C., F.C.S., Pettits Hall, Chigwell. (Chem.)
- Jackson, F. W. J., "The Pines," Ashstead, Surrey. (Lep.)
- James, Russell E., c/o Messrs. James Priestley, Sun Court, Golden Lane, E.C. 1. (Lep.)
- *Kaye, W. J., F.E.S., "Caracas," Ditton Hill, Surbiton, Surrey. (Lep.)
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- Lake, G. F., 6, Grove Avenue, Muswell Hill, N. (Arch.)
- Lemon, F. E., M.A., LL.B. (Cantab.), J.P., C.A., "Hillcrest," Redhill, Surrey. (Orn.)
- Lemon, Mrs. M. L., M.B.E., J.P., M.B.O.U., F.Z.S., "Hillcrest," Redhill, Surrey. (Orn.)
- Leyton Public Libraries, per the Librarian (Z. Moon, F.R.Hist.S.), Central Library, Leyton, E. 10.
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- Martin, Alan R., 18, Kidbrooke Park Road, Blackheath, S.E.3. (Arch.)
- Mera, A. L., 5, Park Villas, High Road, Loughton, Essex. (Lep.)
- Mera, A. W., 5, Park Villas, High Road, Loughton, Essex. (Lep.)
- Moore, J. E., 6, Alwyne Villas, Canonbury, N. 1.
- Murray, L. C., 165, Fox Lane, Palmer's Green, N. 13. (Ent., Geol., Bot.)
- *Nicholson, Miss B., "Rothbury," Langdon Road, Upper Parkstone, Dorset. (Bot.)
- Parsons, S. T. T., 25, Pembroke Gardens, Notting Hill Gate, W.2. (Orn.)
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- Payne, H. T., 70, Castlewood Road, Stamford Hill, N. 16. (Lep.)
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 Robbins, R. W., "The Rosery," Limpsfield, Surrey. (Bot., Lep., Orn., Arch.)
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 Sabine, L. A. E. (Address not known.) (Lep.)
 Sagar, H., Holly Hill Farm, Botany Bay, Enfield. (Orn.)
 Samuelson, Edward, "Fairview," 39, The Ridgeway, Chingford, E. 4. (Mam., Rep.)
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 Spooner, Herman, 21, Musgrave Crescent, Walham Green, S.W. 6. (Orn., Bot., Arch.)
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 Stevenson, H. E., F.C.S., 22, Wilton Grove, Wimbledon, S.W. 19. (Chem.)
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NOTE.—The following abbreviations are used in the above lists:—Api., Apiculture; Arch., Archaeology; Ast., Astronomy; Biol., Biology; Bot., Botany; Chem., Chemistry; Col., Coleoptera; Conch., Conchology; Dipt., Diptera; Ent., Entomology; Ethn., Ethnology; Geol., Geology; Hem., Hemiptera; Hym., Hymenoptera; Ichth., Ichthyology; Lep., Lepidoptera; Mamm., Mammalogy; Micr., Microscopy; Neur., Neuroptera; Orn., Ornithology; Orth., Orthoptera; Ool., Oology; Rep., Reptilia; Zoo., Zoology. * Signifies a Life Member.

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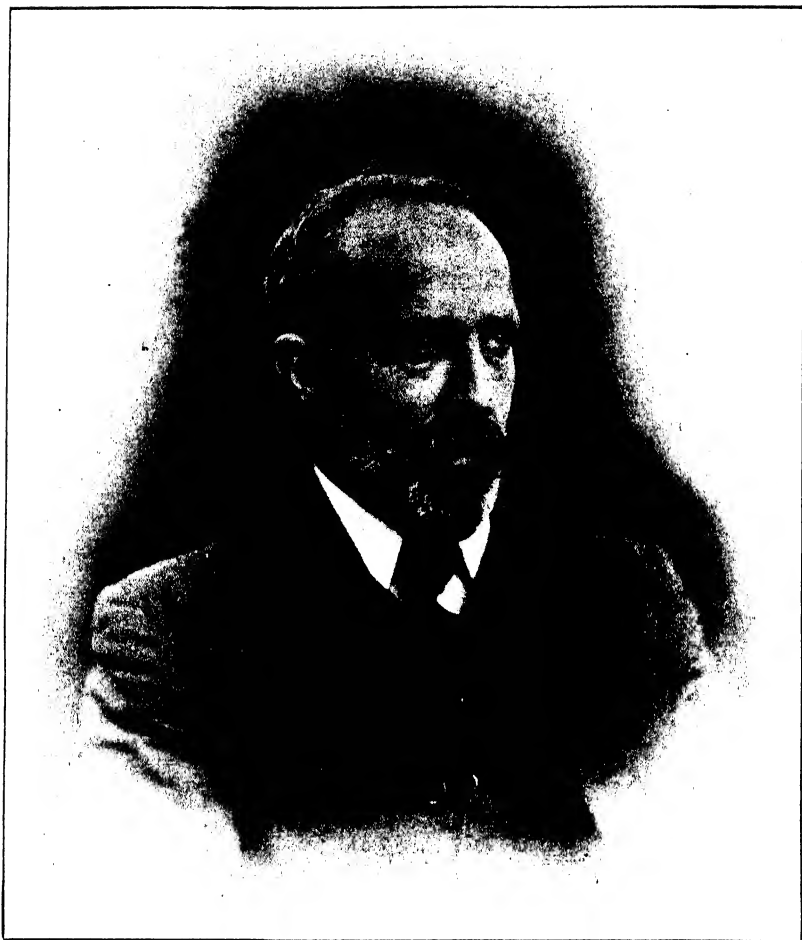
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ARTHUR WILLIAM BACOT

8. SEP. 1924

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PRESIDENT'S ADDRESS

By E. B. BISHOP.

Read at the Annual General Meeting of the Society on December 4th, 1923.

WHILST, as a society, we are very much concerned—and rightly so—with our own internal well-being, with efforts to increase membership and influence, attendance at meetings and excursions, activities of members, excellence of lectures and exhibits, financial position, and so on, the existence of a far more vital problem for naturalists and nature-lovers is ever present, consciously or sub-consciously, in the minds of most of us, especially of those who have a generation or more of experience behind them. We have to face the grim unpalatable fact that the very theatre of our activities, the *raison d'être* of our existence as a society, is diminishing in area day by day as cities increase, and the domain of wild nature, or anything approaching thereto, correspondingly contracts. As a result of the same process, historic old buildings are offered up as sacrifices on the grimy altar of utilitarianism.

The most gloomy of certain other contingencies, such as the possible approach of another glacial epoch, or the gradual cooling of our globe, are far too remote to add to the despondency of even an ultra-morbid pessimist. But the blindest optimist cannot avoid an encounter with this other many-headed dragon who, here and now, has planted himself down so threateningly in our path.

What is so humorously known as the march of Progress, with its attendant legions of increasing population, will no doubt provide yet more ample scope for the energies of our bacteriologists, and may not seriously interfere with microscopists and students of pond life, but with all due reverence for such distinguished and most necessary colleagues, exalted far above us of the common herd, these exalted ones comprise but a small fraction of those usually classed as naturalists.

At this stage I can almost hear some of you saying, "Well, even if we agree, what is to be done?" I grant, at once, that I have no actual remedy. When *Homo sapiens* begins to justify the name which must have been given him in most bitter irony, matters may improve. Let us hope it will not then be too late.

You can, if so minded, as I am continually, curse most heartily the sorry idiocy which fouls the well-springs of happy existence, by producing too many crowded human lives to permit true enjoyment by any of them of God's supreme gifts. Those who regard this country and most others as already far too densely peopled, who are convinced that

over-population is the chief cause of such evils as unemployment, housing shortage, etc., and in matters international, of war itself, can only wish most speedy success to the advocates of birth control, and trust that our near posterity may behold with serenity the altars of Lucina becoming objects of purely archaeological interest, the while devoutly burning incense before the shrine of Malthus.

I am well aware that much of this is in strictness appurtenant to the sociologist, and perhaps I ought to apologise for this brief incursion into his domain. The whole matter is, however, of such urgent importance to the naturalist that I feel bound to lay stress upon it, as an introduction to my address to-night.

Amongst other societies which are doing heroic service on our behalf, with wofully insufficient assistance, both moral and material, there are three which deserve special mention :—The Commons and Footpaths Preservation Society; the National Trust for Places of Historic Interest or Natural Beauty; and the Society for the Protection of Ancient Buildings. The extent of our indebtedness to these loyal friends is only faintly realised even by those of us in touch with them. To the vast majority of people, indeed, I am afraid, to the vast majority of naturalists, they are little more than mere names.

Many a common, and many more footpaths, over and along which most of us here to-night have often been privileged to roam, would to-day be closed to us but for the timely action of the Commons and Footpaths Preservation Society. To-day the National Trust holds as trustee for the people of the nation upwards of 20,000 acres of land—mountains, hills, woodlands, heaths, fens, ponds—free and open to all, and about 20 historic old buildings, to some of which a small charge is made for inspection. All these were acquired through the grace of a few hundred generous donors or subscribers. And how many a noble old building would have been lost to us for ever, or have been hopelessly mutilated, but for the Society for the Protection of Ancient Buildings?

Mention must also be made of the excellent work done by the Royal Society for the Protection of Birds, not only in the interests of scientific ornithologists, but of all bird lovers. Thanks to the activities of its "Watchers" Committee, many rare and much persecuted birds have been enabled to rear their young in these islands. Quite recently this Society was instrumental in stopping winter shooting over one of the largest groups of reservoirs in England, the waters of which are frequently visited by interesting birds. Long may it continue its useful existence!

We do not deserve to have secured for us either hunting grounds for naturalists, or peaceful spots for nature lovers, or venerable old buildings, unless, individually and collectively, we are prepared to assist by every means in our power the doughty champions of our common cause. Too often these champions are left to fight, practically alone, against almost overwhelming odds, and are either defeated or compelled to make an ignominious compromise.

In the shameful years of the late eighteenth century and the early

nineteenth, when Enclosure Acts robbed us of our commons by thousands of acres at a time, it was the great landed interest which was our foe, but to-day we have not much ground of complaint in that direction. Indeed, in my wanderings in the by-ways of old England, I am surprised, again and again, at the extent to which one is permitted to roam over private land. The passing away, as landowners, of our old nobility and our squires, however welcome such may be to certain voluble doctrinaires, will be, most certainly, a grievous misfortune to naturalists.

To-day our heritage is too often menaced by those elected to represent us. The Government, as in the recent monstrous attempt by the War Office at Lulworth Cove, is a notorious offender. Municipal councils are perhaps even worse. Take the case of the proposed seizure of a Welsh valley by the Warrington Corporation for a new waterworks scheme. This has received the sanction of the recently defunct House of Commons, despite the protests of its inhabitants and the local county council. Those who have seen the ghastly eyesores which Manchester has created at Longdendale (Cheshire), and Darlington (or is it Stockton?) at Lunedale (Yorkshire), or who have gazed in pained amazement at the "Jumbo" Water Tower at Colchester, may well wonder what next to expect when the average heavy-footed town council is permitted to work its anything but sweet will upon a hitherto smiling landscape.

Occasionally we are encouraged by a great victory over the powers of darkness. Quite recently, following upon the splendidly organised opposition to the proposal of the Croydon Town Council to demolish the old Whitgift Hospital, the contemptuous refusal by the House of Lords, even to consider such a proposition, was one of the most fitting answers to utilitarian vandalism that we have seen in our day. The following extract from the speech of the Marquis Curzon of Kedleston on that occasion will, I trust, commend itself to you all.

"I am delighted when I see growing up in this country an increasing historical sense that links us by indissoluble bonds with the past which is so swiftly going away. I feel that the preservation of these ancient places, their presence in our midst, the fact that they are there as a daily object to be seen by our children as they grow up, not only imbues a spirit of local pride in the places where they exist, but adds to the romance of our surroundings, and strikes a note of beauty, tranquility and peace in a world of revolting garishness, overcrowding and noise. I think, therefore, that the preservation of these places, wherever they exist, is almost in the category of a national duty, and that they inflict a wound upon the State who, heedlessly or thoughtlessly, for some utilitarian interest, destroy that which can never be replaced. You can make another motor road; you can never build another Whitgift Hospital."

The enormous growth of fast motor traffic threatens the very existence of those hedgerows which are such a feature of our land. The result of merciless clipping, and the thick layer of deposited dust,

have so transformed the hedgerows of a main road, that very few naturalists would now choose such spots as hunting grounds. Yet I can well remember, in my young days, a popular little Natural History book, by the Rev. J. G. Wood, entitled "Our Woodlands, Heaths, and Hedges," showing the value which the author then attached to our hedgerows, from the naturalist's point of view.

As regards main roads, I suppose we must bow, however reluctantly, to the inevitable. But when, at enormous expense to the community, we have provided wide main roads, largely for the benefit of a few, surely we should protest, and make every effort to prevent the same machine-like disfigurement of our by-roads, and even country lanes, mainly to gratify a mere lust for speed, which serves no further purpose, useful or otherwise. In making such protest we are voicing the feelings of thousands outside the ranks of Natural History societies, to whom a country lane, its hedgerows a riot of branch and leaf and flower, providing welcome cover for bird and insect, is one of the most priceless treasures of our race. Cut back now and then, as a hedge has been treated from time immemorial, its homely beauty appeals to the eye and heart of every human being with a soul worth saving. Incessantly trimmed low down, so that the motorist can have the widest field of vision, its banks always kept smooth and tidy, it is maimed into little more than a dull featureless line, almost destitute of birds, insects, and plants, and practically incapable in such condition of fulfilling its important functions of being wind-screen and shade for cattle and sheep.

Golf clubs are also serious offenders, especially as they are so frequently allowed to invade commons and other public ground, and the inevitable continual cutting, rolling and smoothing down, is as destructive of wild life as it is offensive to all decent rambles.

Oil refuse thrown out from ships has resulted in much destruction of bird life, and fouling of our foreshores. Steps have been taken by port and other authorities to remedy this evil, so far as my experience goes with marked success.

So much for actual encroachments, whether on the plea of necessity or otherwise, upon our most priceless possessions. Now let us consider how those possessions are treated by those who have the privilege of using them. In the district in which I live, I am made but too painfully aware how "every prospect pleases and only man is vile." After a week or two of drought, such as we get almost every summer, the view from any hill round about Godalming is rarely free, on any day, from the smoke of a heath or woodland fire, the result of criminal deliberate mischief or almost equally criminal carelessness. Here yet again, the destruction of fauna and flora must be very considerable, whilst the beauty of a common may be sadly impaired for years.

Much correspondence appeared, a few weeks ago, in the "Times" and other newspapers, complaining of the defilement of our countryside with rubbish of all kinds, especially paper, bottles and tins, thrown about by visitors, after enjoying the meals contained therein in the

open air. This scattering of rubbish has undoubtedly increased since the advent of the long distance motor-bus, though by no means restricted to the passengers of such vehicles.

In this connection, the following extracts from speeches made upon the occasion of the dedication of an additional 282 acres to Box Hill by the National Trust, are of the greatest interest. They are taken from the "Times," of November 23rd, 1923. Sir Benjamin Brodie, Chairman of the Box Hill Management Committee, in the course of his opening speech, said—

They had an extremely beautiful property on Box Hill, which was well worth taking care of for the benefit of the public. Those who knew the hill as intimately as he did knew that after Bank Holidays and other days when the public came there in large crowds, the rubbish, paper bags, and glass left about was really beyond anything imaginable. It would be a most excellent thing if something could be done to instil into people's minds the fact that they were responsible for maintaining the amenities of that beautiful place.

And Viscount Grey of Fallodon, in a subsequent address, was even more emphatic—

The importance of being careful, when visiting places like Box Hill, not to do anything which impaired the amenities of them ought to be impressed on the rising generation particularly. What happened on Box Hill after Bank Holidays resulted simply from thoughtlessness, but after every Bank Holiday about £40 or £50 had to be spent in rendering Box Hill beautiful again. He thought the rising generation might be brought up to feel that places like Box Hill, which were handed over to the National Trust to be held in trust for the community, were really the property of the public. The public ought to feel about them as if they were their own property; that they had to take a pride in them and treat them with the same care, respect, and regard as anyone did his own private garden.

Unless drastic measures are taken speedily to abate this nuisance, it is reasonably certain that much privately-owned land, upon which the public are now permitted by favour to roam, will be closed to us. Legislation, with by-laws making such practices punishable and subjecting offenders to penalties, should certainly be promoted, and Natural History societies and other associations of decent people should take the lead in pressing for such laws. But, in the meantime, much good might be done if every Natural History society systematically called the attention of its members to this matter, and every member acted as a missionary in the good cause. In this connection, I am happy to be able to state that our local Godalming Natural History Society, in the establishing of which it was my privilege to take some part, calls special attention, on its membership card, to this deplorable practice. For the information and guidance of other societies, the following extract from this membership card may be of service:—

Whilst zealously maintaining public rights, the Society desires to impress upon its members, and the public generally, that they in their turn must recognise the rights of property owners in the course of their rambles. Special attention is drawn to the following:—

Do no damage to fences, growing crops or woods.
 Do not disturb game, or domestic animals.
 Do not leave about paper, bottles, or other rubbish.
 Do not gather wild flowers, ferns, etc., recklessly or indiscriminately.
 Do not cut or scribble your names or initials upon trees, or upon the
 walls, windows, etc., of Churches or old buildings.

SHUT ALL GATES AFTER YOU.

Is it too much to hope that the Minister for Education, whoever he may be, will be induced to authorise attention to be drawn to this matter in the schools under his charge throughout our land?

The extent to which we allow our rivers and streams to be polluted is saddening and disgusting to every nature lover. Follow any river down from its source on a hill or mountain side to its mouth, and all too soon its purity becomes a steadily diminishing quantity, until finally it is often little better than a sewer. Factories discharge into it their refuse, towns regard it as the natural channel for disposal of their sewage effluents, and thus, too frequently, it becomes as malodorous as it is ugly and depressing. *Homo sapiens*, for all his vaunted superiority, is in this respect on the same unhygienic level as *Bos taurus*, who fouls her drinking water whilst slaking her thirst. Man, the thinker, the master of things, attempts to justify himself by pleading business necessity. The cow, were she in a position to imitate man by adding argumentativeness to her other follies, would no doubt put forward the same plea, with quite equal justification.

As bearing upon this point, a further quotation from the speech of Viscount Grey of Fallodon, already mentioned, may be permissible—

They might travel through some parts of the country which were naturally most beautiful in hills, valleys, woods, and rivers, and see the rivers black with pollution, the whole country built over, and such trees as were left killed by the fumes from factories. It gave one a feeling of great pessimism to see that. The industry was flourishing, no doubt, but one could not help feeling that there might be something unsound in an industrial civilization which based its prosperity upon turning what was once exceedingly beautiful into something which now was exceedingly ugly.

Just a few words, and they will be but few, to those in our own naturalist ranks. Although we naturalists are usually most quiet and unobtrusive folk, the very last people to interfere with the comfort of others, or to annoy them in any way, yet one must sadly admit that the virtual extinction of more than a few rare birds and insects, and possibly plants, is due, to a large extent, to the selfish rapacity of a few of our colleagues. I should be delighted if something could be done to bring home to such offenders a full sense of their responsibility to their present colleagues, and to all naturalists of the future.

Much of this address has, I am fully aware, been a long recital of woes, possibly wearisome to many of you. If so, I can only ask you to bear with me for a few more minutes, as patiently as you are able. To me, the whole subject is the one thing that really matters for the naturalist in these days. No progress in mechanical science, no increase in national production, no mere growth of towns, can compensate for

the divorce of our fellow countrymen from direct contact with dear old Mother Earth. The fruits of the sordid Mammon-worship which has brought about the present state of things are to be seen all around. To the average engineer, a great waterfall is not one of the most awe-inspiring works of the Creator, but merely a potential source of energy, which by tunnel and turbine can be tapped to drive countless clattering wheels in near and distant factories. Smiling stretches of rural England, especially those intersected by main roads, crags and hill-sides, river-banks and meadows, are to the devotees of the muck-rake but suitable vantage spots, whereon to erect blatant enamel and other abominations, which shout the usually non-existent merits of their more or less spurious wares. And the acquiescent slaves of all this sorry business are the ill-mannered crowds who pour forth from the towns and, after a hilarious parody of enjoyment, leave behind them, to the defilement of the countryside, the quantities of rubbish already mentioned.

The lack of reverence displayed by all these classes is, to me, the most appalling feature of our modern life. A mountain summit, a waterfall, any setting of natural beauty, is in very truth an altar of the Most High, to vulgarise or defile which should be regarded by any decent person as an act of sacrilege, akin to the defilement of an altar in a church.

Granted, of course, that commerce should take its due place, that is the whole burden of this discourse. And that place was defined many hundred years ago, by One who bade us consider the lilies, who taught us that life is more than meat, and the body than raiment.

Would that all Natural History societies and kindred bodies throughout our land could be federated into a strong organisation, which, whilst always watchful on all the matters brought forward to-night, could take immediate action in similar cases to those of Lulworth or Croydon. Such action would of course be taken in concert with the great societies I have mentioned, but the actual fighting should not be left solely to them. I do not consider that we have done our whole duty by paying an affiliation fee and passing an occasional resolution.

For my own part, when my voice is finally silent, if it can be said of me by a few intimate friends that I strove to preserve a few rods of my native land pure and undefiled, I desire no better epitaph, and shall envy no great one his columns of obituary notices in the press, nor even his resting-place in Westminster Abbey.

PAPERS READ TO THE SOCIETY

January 2nd.—"Reminiscences of North Queensland," Millais Culpin,
M.D.

February 20th.—"Some Bird Photographs," P. J. Hanson.

March 6th.—"A Modern Pilgrimage to Old Shrines," E. Chapman.

March 20th.—"The Medico-Entomological Researches of Arthur
William Bacot," M. Greenwood, M.R.C.S.,
M.R.C.P.

April 17th.—"Preliminary Observations on the British Vanessids,"
Harold B. Williams, LL.B., F.E.S.

May 1st.—"Types of Distribution in the British Flora," W. Watson.

May 15th.—"Stones of London," H. Spencer Stowell, M.S.A.

June 5th.—"A Bird Watcher's Criticism of Darwinism," C. S. Bayne.

September 18th.—"Botanical Experiences in 1923," E. B. Bishop,
R. W. Robbins.

October 2nd.—"A Thousand Miles on the Nile in 1923," The Rev.
H. J. Gamble, M.A.

October 16th.—"The Chemistry and Micro-Biology of Soil," L. Eynon,
B.Sc., F.I.C.

November 6th.—"Collecting Experiences in 1923" (Lepidoptera).
Short Papers by Members.

November 20th.—"Birds of the Shetlands," W. E. Glegg, F.Z.S.,
M.B.O.U.

December 4th.—President's Address.

COUNCIL'S REPORT

THE present constitutes the Tenth Report of the Council since the amalgamation. In other words the first decade of the society, in its present form, has been completed.

The chief purpose of this annual report is to convey to the members a true idea of the position of the society, which can be done only by stating, as in previous years, the condition of the finances, membership, and attendances.

Although the income from subscriptions and entrance fees is inadequate to the position of the society, the Treasurer's accounts show that not only is this somewhat better than last year, but that our finances, as a whole, are in a less unsound condition. This has resulted from two causes, the replacement of non-paying by paying members and the policy of rigid economy which has been practised for some years. The most optimistic view of this aspect of our affairs could not be rosy, but it is reassuring to know that we have moved in the right direction.

Turning to the question of membership we find that during the course of the year we have lost from various causes ten members, eight branch associates and two country associates. Against this eight members, nine branch associates and two country associates have joined the society. The best guide, as was stated in last year's report, to the condition of the membership is the state of the income from subscriptions, so it may be assumed that some measure of progress has been made.

The consideration of the attendances presents almost a cheerful picture. During the past few years they have made steady progress, and this year the average reaches the satisfactory figure of 81.4 per meeting, an increase of 5.4 on 1922. Thus the average number attending the meetings is nearly 50 per cent. ahead of 1920, and the fact that we have held 15 society meetings this year against twelve last makes this still more satisfactory.

Practical work in the field has received due attention, 28 meetings having been held under the auspices of the different sections. To some of our members these meetings prove especially attractive.

The Council always has in view the importance of giving the fullest possible publicity to the society and its work. In this connection it may be stated that, on the suggestion of Mr. J. P. Hardiman, an arrangement has been made with the Over Seas League, entitling members of that body, home on leave, to attend the meetings of the society. Perseverance along such lines is of great importance to our work.

The Publication Committee has laid before the Council proposals, emanating from Mr. H. J. Burkill, for the improvement of "The London Naturalist." In future, it is hoped, that articles of an original nature, which have not been read at meetings, will appear in the annual publication. Members having such matter are invited to send it to the editor for consideration.

The Chingford Branch still maintains a healthy activity, and the fact that Messrs. Hubbard and Samuelson still continue to occupy the positions of chairman and secretary augurs well for the future.

Under normal conditions the consideration of our first ten years might have been expected to have supplied us with some guidance, with some sort of foundation on which to base our plans for the future. Unfortunately the war has enveloped our activities in a smoke screen which has obscured much from which deductions might have been drawn. The loss of such lessons, apart from material losses, is a serious handicap. It has been written "Progress is born of experience." Looming through the obscurity are certain bold outlines which should not be overlooked. It can be said with safety that the fact that the society was able to continue its work during these difficult times is largely attributable to the amalgamation. The loyalty of the members was severely taxed. It was not found wanting, and in this connection the relatively large sums which have been subscribed to publish the annual volume are noteworthy.

WILLIAM E. GLEGG, *Hon. Sec.*

REPORTS OF THE SECTIONS

ARCHAEOLOGICAL SECTION

THE Section has had a fairly active year; four sectional meetings, three formal and three informal excursions.

The four sectional meetings were occupied chiefly with the discussion of Records, but at that on April 10th an interesting and valuable paper on "Old Bricks and Tiles" was read by Arthur Locke, C.B.E.

The formal visits were to Ickenham Church, Middlesex, on March 24th; Merstham Church, Surrey, on May 5th; and Cliffe at Hoo Church, Kent, on October 18th. Full records were made in each case. The three informal visits to Mickleham Church, Surrey, on April 21st; Mucking Church, Essex, on July 21st; and St. Bartholomew the Great, on December 8th.

During the year one member resigned and two were elected, the membership now being 26. There has been throughout an improved attendance.

The section is indebted to its recorder, Mr. Stowell, for the admirable way in which he has rearranged the recording scheme, so as to insure that a deputy shall be available where any member responsible for a section of the record finds attendance at the inspection impossible.

On February 1st the fourth annual dinner of the section was held at the Ship Restaurant, Whitehall. The guests of the evening were Mr. and Mrs. Stowell.

DOUGLAS B. ALLINGHAM, *Hon. Secretary*,

BOTANICAL SECTION

THE annual meeting of the section was held on December 18th, when all the officers were re-elected.

At the annual meeting of the society Mr. W. Watson was appointed botanical curator, in the place of Mr. L. B. Hall, who, unfortunately, can no longer spare the necessary time for the duties.

During the year the section was responsible for papers at two ordinary society meetings, *viz.*, May 1st, "Types of Distribution in the British Flora," by Mr. W. Watson; and September 18th, "Botanical Experiences in 1928," by Messrs. E. B. Bishop and R. W. Robbins.

The two sectional meetings allotted were occupied by discussions on the order *Rubiaceae*, and the district records of the order *Ranunculaceae*.

The annual week-end at the end of May, was again spent at Birling, Kent, under the leadership of Mr. R. W. Robbins, and was, as usual, successful and enjoyable. Three hundred and thirty-six species were noted, mostly those of the previous year, but some interesting new ones were observed. Amongst the latter may be mentioned *Carex strigosa*, Huds., some puzzling *Violas*, apparently intermediates between *hirta*, L., and *calcareae*, Gregory, and a form of *Silene latifolia*, Rendle and Britten, approaching var. *puberula*, Jord., with pubescent stems and leaves, but with glabrous calyces. *Orchis purpurea*, Huds., was more in evidence than in 1892, but *Salvia pratensis*, L., could not be found on the ground where it was seen the previous year. Possibly it was not yet in flower.

Further field meetings were held as follows:—

April 14th, Chislehurst and Orpington. Leader, Mr. W. Watson.—*Carex strigosa*, Huds., and *Salix aurita*, L., were found at Clapton, the latter in a hedge on clay.

May 12th, Box Hill. Leader, Mr. E. B. Bishop.—*Viola calcarea*, Gregory, was observed; also abundance of the greyish white-flowered form of *Polygala calcarea*, F. Schultz.

June 19th, Epping Forest (evening excursion). Leader, Mr. R. W. Robbins.—The ponds between Walthamstow and Woodford were examined, and yielded *Ranunculus drouetii*, F. Schultz; *Hottonia palustris*, L., *Utricularia vulgaris*, L., and *Hydrocharis morsus-ranae*, L. On the muddy margins *Glyceria declinata*, Bréb., occurred in some quantity, and in damp spots were found *Galium uliginosum*, L., *Salix repens*, L. f. *incubacea*, Syme, and *Glyceria fluitans* × *plicata* (= *pedicellata*, Towns.), the last in some abundance.

August 18th, Effingham and Wisley. Leader, Mr. L. G. Payne.—Some interesting plants were seen, including *Agrimonia odorata*, Mill., in abundance at the edge of a wood, *Veronica scutellata*, L., var. *hirsuta*, Weber., in some quantity (with type), *Juncus effusus*, L., × *inflexus*, L. (= *diffusus*, Hoppe.), a large and conspicuous patch, and *Alisma lanceolatum*, With. All, except the first-mentioned, were growing just outside the society's district.

Amongst other noteworthy species observed, during the year (unless stated otherwise), in the society's district, may be mentioned the following:—A form of *Campanula rotundifolia*, L., with corolla divided to its base into five narrow strap-shaped segments, several plants being found in one area; *Amaranthus retroflexus*, L., as a casual; *Caltha palustris*, L., var. *Guerangerii*, Bor.; *Chrysosplenium alternifolium*, L.; *Carex strigosa*, Huds.; and *C. helodes*, Link. These were found round about Limpsfield and Oxted, by Mr. R. W. Robbins. *Galanthus nivalis*, L., found in Surrey by Mr. L. G. Payne, in great abundance, remote from houses. *Geranium pratense*, L., observed by Mr. L. J. Tremayne, at a station in Middlesex not mentioned by Trimen and Dyer, but seemingly not introduced.

Mr. W. Watson is responsible for the discovery and identifications of the following:—*Polygonum dumetorum*, L., in Abbey Wood, Kent, in 1922; *P. bistorta*, L., in a wood at Hayes, Kent, and at Brasted,

Kent; *Viola sylvestris*, Kit., *Flore rubro*, hitherto unnoted, along with the very rare *Oxalis acetosella*, L., var. *subpurpurascens*, Duc., at Brasted Hill; *Anagallis arvensis*, L., *Flore violaceo*, at Chipstead; whilst *Rubus holerythros*, Focke, at Hayes Common and St. Paul's Cray Common, does not seem to have been noted previously for Kent, and *R. gratus*, Focke, was found at Burgh Heath, a new Surrey station for this rare species.

Outside the district, Mrs. Wilde has found *Potentilla erecta* × *procumbens* (= *suberecta*, Zinn.) Salop; *Centaurea solstitialis*, L., near Godalming, Surrey; and *Carex pilulifera*, L., var. *longibracteata*, Lange, near Wareham, Dorset. Mr. E. B. Bishop has observed *Centaurea solstitialis*, L., at Strood, Kent; and *Campanula latifolia*, L., in a wood in Surrey, apparently not previously recorded from that particular station.

During the year one species has been added to the records for the northern portion of our area, and 23 for the southern. The most noteworthy of the latter, other than those previously mentioned in this report, are as follows:—*Silene dubia*, Herbiech, *Senecio squalidus*, L., *Teucrium botrys*, L., *Herminium monorchis*, Br., *Scilla autumnalis*, L. The second mentioned of these occurred in West Kent, the others in Surrey.

All members are earnestly requested to send to the recorder full lists of plants observed within the society's district, even of the most common species, with dates and, whenever possible, specimens in all cases of rare and critical plants.

R. W. ROBBINS, *Chairman*.

E. B. BISHOP, *Secretary*.

ORNITHOLOGICAL SECTION

THE annual meeting of the section was held on December 18th, 1923, when the following officials were elected to form the Committee for 1924:—Chairman, W. E. Glegg, F.Z.S., M.B.O.U.; Secretary, J. P. Hardiman, B.A., C.B.E.; Recorder, A. Brown; Committee, S. Austin, C. S. Bayne, J. E. S. Dallas, P. J. Hanson. Mr. J. E. S. Dallas was elected to represent the section on the Publication Committee.

The section having been invited by the Chairman of the Publicity Committee of the Royal Society for the Protection of Birds to elect one of its members to assist them in their work, the name of Mr. C. S. Bayne was submitted. Mr. Bayne has been duly appointed and is now serving on the above named Committee.

The section provided the following papers for the society's syllabus, which were read at ordinary meetings, viz.:—February 20th, "Some Bird Photographs," by Mr. P. J. Hanson; June 5th, "A Bird Watcher's Criticism of Darwinism," by Mr. C. S. Bayne; November 20th, "Birds of the Shetlands," by Mr. W. E. Glegg, F.Z.S., M.B.O.U.

Two sectional meetings were held, at which the following papers

were read, viz.:—April 10th, "Bird Life in North-East London," by Mr. R. W. Pethen; September 4th, "Birds seen at Meudon, near Paris," by Mr. J. P. Hardiman, B.A., C.B.E.

At the Chingford branch of the society ornithological lectures were delivered on the following dates:—May 14th, "Economic Ornithology," by Mr. H. H. Wardle, F.R.H.S.; and September 10th, when Mr. Pethen repeated his lecture previously given at Winchester House. On January 27th the members of the section visited the ornithological department of the British Museum, when Mr. N. B. Kinnear, C.M.Z.S., M.B.O.U., gave a demonstration on "Local Races."

The programme of monthly field meetings was successfully carried through, the following visits being made:—

DATE.		DISTRICT.			LEADER.
January	28.	Tring	...	...	P. J. Hanson.
February	25.	Tilbury Marshes	...	...	P. W. Horn.
March	25.	Barling Marsh	...	...	W. E. Glegg.
April	29.	Leighton Buzzard	...	...	O. G. Pike.
May	27.	Wendover	...	...	J. P. Hardiman.
June	24.	Limpsfield	...	...	R. W. Robbins.
July	29.	Balcombe	...	...	C. S. Bayne.
August	26.	Tring	...	...	P. J. Hanson.
September	30.	Stoke Mandeville	...	...	J. P. Hardiman.
October	28.	Elstree	...	...	Miss H. Watkins.
November	25.	Navestock	...	...	P. W. Horn.
December	30.	Canvey Island	...	...	S. Austin.

The committee of the section held three meetings during the year.

With the publication of the eighth annual report on the birds observed in Epping Forest, in 1923, the committee propose to bring to an end the present extended form of this report which, for the current year, takes the shape of an epitome of the status of each species recorded during the eight years of the investigation. In future years it is hoped to publish a short statement of additions to the list as well as other interesting occurrences.

During 1923 the section contributed 115 schedules of rings used to the "British Birds" marking scheme. One recovery of a "marked" bird has been reported; a song thrush "ringed" by Mr. W. E. Glegg, in the Scilly Islands, on June 9th, 1920, having been recovered in the same locality on June 17th, 1922.

The photographic collection now stands at 144 sheets, with the addition of 11 sheets during the year.

In response to a suggestion by the committee the British Ornithologist's Union have published, in an abridged and inexpensive form, their official list of British birds, revised to date. The new hand-list was placed on sale last autumn.

The need for further protection of the nesting birds in Epping Forest has been a pressing one for some time past, and the committee was approached with a view to some action being taken. Evidence

having been collected and a list of suggestions prepared, both were submitted to the Royal Society for the Protection of Birds, who were so far impressed as to carry out an independent investigation. As a result a strong representation was made to the Epping Forest Committee, of which but scant notice appears to have been so far taken. The matter is not to be allowed to drop.

As the result of negotiations which have been carried on for some time by the Royal Society for the Protection of Birds, the Metropolitan Water Board has decided to stop the shooting of wild fowl which took place annually at Walthamstow Reservoirs. The society has been associated with these negotiations, which have ended so successfully, and members of the section have rendered practical assistance.

Four species new to the society's district have been recorded, making the total number 172. These new occurrences are:—*Regulus ignicapillus ignicapillus* (Firecrest), October 21st, Tadworth, Surrey, reported by Howard Benthams (see "British Birds," vol. 17, p. 165); *Numenius phaeopus phaeopus* (Whimbrel), September 9th, Staines Reservoir, reported by W. E. Glegg; *Chlidonias niger niger* (Black Tern), September 9th, Staines Reservoir (5), reported by W. E. Glegg; and *Coturnix coturnix coturnix* (Quail), November 19th, Sewage Farm, Ponder's End, reported by P. J. Hanson, in whose possession the skin is.

One new nesting record is as follows:—*Nyroca ferina ferina* (Pochard), 2 adults and 5 young, Walthamstow Reservoirs, July 29th, and 1 adult and 4 young, same place, October 6th, both reported by A. Brown.

Other interesting records for the year are as follows:—*Corvus cornix cornix* (Hooded Crow), October 7th, near Elstree, reported by Miss H. Watkins; *Spinus spinus* (Siskin), December 2nd, Highams Park (6-10), reported by W. E. Glegg; December 16th, same place (12), reported by S. Austin and J. P. Hardiman; *Emberiza calandra calandra* (Corn Bunting), July 28th, Staines Reservoir (singing), reported by W. E. Glegg; *Anthus spinoletta petrosus* (Rock Pipit), October 28th, Elstree Reservoir, reported by C. S. Bayne, W. E. Glegg, and P. J. Hanson; *Lanius excubitor excubitor* (Great Grey Shrike), December 18th, 1922, Walton-on-the-Hill, Surrey, reported by Howard Benthams (see "British Birds," vol. 17, p. 165); *Saxicola torquata hibernans* (British Stonechat), April 15th, Walton Heath, Surrey (pair), reported by J. E. S. Dallas; May 26th, Cuckoo Hall Farm, Edmonton, reported by W. E. Glegg; September 29th, Fairmead Bottom, Epping Forest, 2 ♂s and 1 ♀, reported by P. D. Hayward, per S. Austin; December 8th, Staines Reservoir (2), reported by A. Holte Macpherson; December 12th, Brent Reservoir, reported by J. P. Hardiman; December 15th, Petersham Park, reported by J. E. S. Dallas; *Oenanthe oenanthe oenanthe* (Wheatear), July 28th, Staines Reservoir (2 or more), reported by W. E. Glegg; August 25th, Walthamstow Reservoirs (1 or 2), reported by W. E. Glegg; *Riparia riparia riparia* (Sand-Martin), on May 28th, several birds observed at Rye House Station, G.E.R., carrying nesting material and disappearing into holes in the brickwork of

the side of the platform, just over the metals (see "British Birds," vol. 17, p. 187); *Dryobates minor comminutus* (British Lesser Spotted Woodpecker), December 13th, Walthamstow Reservoirs, recorded by P. W. Horn; *Micropus apus apus* (Swift), early date, April 22nd, Walthamstow Marsh (2 seen, morning), reported by R. W. Pethen; same day, Springfield Park, Clapton (2 seen morning, 5 afternoon), reported by A. Brown; *Tyto alba alba* (Barn-Owl), nested in the roof of an old house on Clapton Common, two broods (each of 2 birds) being hatched out, one in July and the other in November, reported by C. Hollocks, per A. Brown; *Carine noctua mira* (Little Owl), July 19th, nested at Botany Bay Farm, Enfield, reported by H. Sagar; *Anas strepera* (Gadwall), November 4th and 5th, Round Pond, Kensington Gardens, ♂, a park keeper reported that the bird had been seen on the pond for two years; also reported by W. M. Crook and by G. C. Low; Dr. Low also reported a second drake in the autumn of 1922 at the same place (see "British Birds," vol. 17, pp. 165 and 198); *Mareca penelope* (Wigeon), December 8th, Staines Reservoir, reported by A. Holte Macpherson; December 16th, same place (a few), reported by W. E. Glegg; *Spatula clypeata* (Shoveler), August 11th (3), August 8th (1), and August 25th (3), Walthamstow Reservoirs, reported by W. E. Glegg; September 3rd, Strawberry Hill Pond, Epping Forest, reported by Keeper Stubbs, per S. Austin; December 16th, Staines Reservoir (2 or more), reported by W. E. Glegg; *Nyroca marila marila* (Scaup), November 4th and 5th, Round Pond, Kensington Gardens, reported by W. M. Crook (see "British Birds," vol. 17, p. 165); December 15th, Staines Reservoir (1), reported by A. Holte Macpherson; December 29th, Staines Reservoir, reported by C. A. Cresswell, per A. Holte Macpherson; *Glaucionetta clangula clangula* (Golden-eye), December 8th, Staines Reservoir, reported by A. Holte Macpherson; December 16th, same place (a number, both sexes), reported by W. E. Glegg; *Mergus merganser merganser* (Goosander), December 8th, Staines Reservoir (4), reported by A. Holte Macpherson; December 16th, Staines Reservoir (1), reported by W. E. Glegg; December 26th, Staines Reservoir (11, two being old males), reported by A. Holte Macpherson and J. Rudge Harding; *Mergellus albellus* (Smew), December 8th, Barnes Reservoir (♀ or young), reported by A. Holte Macpherson; December 16th, Staines Reservoir (1), reported by W. E. Glegg; *Scolopax rusticola rusticola* (Woodcock), February 14th, Fairmead, Epping Forest, reported by Keeper Stubbs, per P. W. Hayward and S. Austin; November 25th, High Beach, Epping Forest, reported by Mr. Roper of Loughton, per P. W. Hayward and S. Austin; November 30th, Warren, Epping Forest, reported by Keeper Stubbs, per P. W. Hayward and S. Austin; *Erolia alpina alpina* (Dunlin), August 18th, Walthamstow Reservoirs, reported by W. E. Glegg; *Tringa totanus totanus* (Redshank), December 1st, Barn Elms Reservoir, reported by A. Holte Macpherson; *Tringa hypoleucos* (Common Sandpiper), April 27th, Connaught Water, Epping Forest, reported by H. C. Playne, per S. Austin; July 28th, Staines Reservoir (9), reported by W. E. Glegg; August 11th (2), and 18th (2), Walthamstow Reservoir,

reported by W. E. Glegg; September 9th, Staines Reservoir, reported by W. E. Glegg; *Tringa ochropus* (Green Sandpiper), July 19th, Botany Bay Farm, Enfield (2), reported by W. E. Glegg; August 11th, Walthamstow Reservoirs, reported by W. E. Glegg; July 9th (4), and 19th (2), and August 12th (1), Holly Hill Farm, Enfield, reported by P. J. Hanson; December 18th, Walthamstow Reservoir, reported by P. W. Horn; *Charadrius hiaticula hiaticula* (Ringed Plover), September 9th, Staines Reservoir, reported by W. E. Glegg; *Larus canus canus* (Common Gull), December 15th, Richmond, reported by J. E. S. Dallas; *Fratercula arctica graboe* (Puffin), October 28th, bird picked up alive, but died subsequently, reported by L. G. Payne; *Podiceps cristatus cristatus* (Great Crested Grebe), September 9th, Staines Reservoir, party of 205, reported by W. E. Glegg; *Podiceps nigricollis nigricollis* (Black-necked Grebe), September 9th, Staines Reservoir, reported by W. E. Glegg; *Rallus aquaticus aquaticus* (Water Rail), July 9th, Holly Hill Farm, Enfield, reported by P. J. Hanson; *Columba oenas* (Stock-Dove), July 19th, Holly Hill Farm, Enfield, reported by P. J. Hanson; September 12th, High Beach, Epping Forest, reported by P. J. Hanson; December 15th, Petersham Park (20), reported by J. E. S. Dallas.

We have to acknowledge with our thanks help rendered in our recording by a number of correspondents.

Seven new members of the society have joined the section during the year, viz.:—Mr. and Mrs. K. O. Nash, and Messrs. A. Holte Macpherson, F.Z.S., R. W. Pethen, J. Rudge Harding, O.B.E., H. Sagar, and R. H. Trench. Our member, Mr. F. G. Mann, Ph.D., B.Sc., A.I.C., has also joined the section.

It is announced, with regret, that Mr. S. Austin has resigned the position of secretary which he has held for four years. The section in accepting his resignation desires to place on record an appreciation of the valuable services which Mr. Austin has rendered to the ornithology of the society during this period. The section is fortunate in obtaining Mr. J. P. Hardiman to fill the vacancy created.

W. E. GLEGG, *Chairman.*

PLANT GALL SECTION

ONE paper was read to the section during the year, on "The Galls on Rubiaceae." Members have taken part in seven expeditions to places in the neighbourhood of London. Individual members have done good work in various localities, as the list of species of galls testifies.

The following notes have been compiled from the records of species sent in, most of which have been exhibited at the society's meetings.

On *Clematis vitalba*, L., *Eriophyes vitalbae*, Can. The mites were seen on examination of distorted leaves, from near Leatherhead. October.

On *Cardamine pratensis*, L., *Eriophyid*. Flowers deformed and distorted. Resembles Houard's 2656 on *C. hirsuta*. Orpington. May. (R. W. Robbins.)

On *Silene latifolia*, Rendle and Britten, *Hyalopterus melanocephalus*, Buckton. Near Harefield. September.

On *S. maritima*, With. The white *Cecidomyid* larvae recorded last year as galling this plant (*Contarinia*? Houard, 2266) from Cornwall, were found near Paignton, South Devon. August.

On *Lychnis alba*, Mill. Flower heads galled by dark claret-coloured Aphides, Harefield. June. (E. B. Bishop.)

On *Stellaria graminea*, L., *Eriophyes atrichus*, Nal. Kingston Vale Batchworth Heath. September.

On *Hypericum perforatum*, L., *Zenaidiplosis Giardiana*, Kieff., Oxted. October. (R.W.R.)

On *Malva moschata*, L., *Eriophyes gymnoproctus*, Nal., Birling. (L. B. Hall.)

On *Tilia platyphyllos*, Scop., *E. tiliae*, Pagenst., var. *exilis*, Nal., Galmpton, Devon.

On *T. vulgaris*, Hayne. (1) The last named mite, near Fulmer, near Leatherhead, and near the Black Pond, Esher. (2) *E. tetratrichus*, Nal. Churston Ferrers, S. Devon, and near Fulmer, Bucks.

On *Rhamnus frangula*, L. (1) *Thrips* sp. distorting the flowers and young leaves, Oxshott. (Dr. Cockayne.) (2) Distorted leaves, pouched, with the edges in contact along the margins. Contains cast skin of Aphis. Resembles Houard's 4064. Near Leatherhead. October.

On *Medicago lupulina*, L. Leaves unopened, *Perrisia* sp. Limpsfield. (R.W.R.)

On *Acer* sp. (foreign). *Eriophyes* sp., corresponds with Houard's 8977. Near Leatherhead. October.

On *Aesculus hippocastanum*, L., *E. hippocastani*, Fockeu. Two localities near Leatherhead, also Ealing, and Holly Hill, Bucks.

On *Vicia sativa*, L., *Perrisia viciae*, Kieff. Galmpton, S. Devon.

On *Rubus idaeus*, L., *Cecidomyid*. Round or oval swellings on the stems, multilocular and multilarval. Larvae orange coloured. Abinger, Surrey. Previously recorded from near Hackness, Scarborough.

On *Rubus* sp., *Perrisia plicatix*, H. Low. Remarkably abundant this year, both near London and in South Devon.

On *Crataegus oxyacantha*, L., *Eriophyes goniothorax*, Nal. Near Batchworth Heath, Middlesex.

On *Silva flavescons*, Bernh., *Perrisia Dittrichi*, Rubs. Plentiful on Epsom Common.

On *Heracleum sphondylium*, L., *Contarinia Nicolayi*, Rubs. Near Swanage. (E.B.B.)

On *Cornus sanguinea*, L., *Oligotrophus corni*, Giraud. Found in two localities in South Devon, where the geological formation is the Red Devonian. Hitherto I have only seen the gall on the chalk.

On *Rubia peregrina*, L. (1) *Eriophyes rubiae*, Can. (Houard, 5822.) Bud gall. Near Broadsands Bay, S. Devon. (2) *E.?* *rubiae*, Can. (Houard, 5822.) Leaf margin rolled upwards. Three localities, S. Devon. These two galls seem to be distinct species.

On *Galium verum*, L. (1) *E. galiobius*, Can. Abundant in one locality in Middlesex, where the grass is usually mown for hay or browsed by horses. Never noticed there before though I have visited the spot for years. (2) *Cacidomyid*. (Houard, 7372.) With the last. Previously recorded on *Galium mollugo*.

On *G. saxatile*, L., *Phyllocoptes anthobius*, Nal. Plentiful round London up to the drought of 1921, which killed many of the plants. Not seen in 1922. Now found again on Epsom Common.

On *G. aparine*, L., *Eriophyid*? The white tipped form recorded three years ago from near Heathrow, Hounslow, was found again a few miles further west than its previous locality, but no mites were detected.

On *Centaurea scabiosa*, L. (1) *Aulax scabiosae*, Giraud. Brockham Downs and Tothill, Surrey. (2) *A. Rogenhoferi*, Wachtl. Harefield and Totthill.

On *Vaccinium myrtillus*, L., *Eriophyid*. Margins of leaves swollen, corrugated, and rolled over the upper surface. Dark red in colour. Clouva, Perthshire. (I. H. Burkill.)

On *Fraxinus excelsior*, L., ? *Eriophyes*. Base of the leaves discoloured reddish brown. The underside covered with a mass of hairs of the same colour. Churston Ferrers, S. Devon.

On *Cynoglossum officinale*, L. *Aphis* sp. curling the leaves. Birling.

On *Veronica montana*, L., *Perrisia veronicae*, Vallot. Limpsfield. (R.W.R.)

On *Thymus chamaedrys*, Fr., *Janetiella thymicola*, Kieff. Birling. (R.W.R.)

On *Ulmus glabra*, Huds. (1) *Oligotrophus Lemcei*, Kieff. Herrons-gate, Bucks, and Leatherhead. (2) *Eriophyes*. White hairs on the veins on underside of the leaf. Leatherhead.

On *Betula alba*, L., *Eriophyes*. Dense felting of straw coloured hairs on young twigs at the base of the trunk. Braemar, N.B. (I.H.B.)

On *Quercus pedunculata*, Ehrh. In the summer of 1921 I introduced into a clump of young oaks of about five years of age some fresh leaves galled by *Andricus curvator*, Hartig. I did not notice any galls of *Andricus collaris* that autumn, but next summer there were fresh galls of *A. curvator* on these bushes, followed by *A. collaris* in October. This year again both forms have been seen. Thus it appears that in the open *A. collaris* flies may emerge in the following spring after the formation of the galls.

On *Q. coccinea*, Wangenheim, *Eriophyes* sp. (Houard, 2006.) Surrey.

On *Q. cerris*, L., *Andricus circulaus*, Mayr. The galls and flies were plentiful in one Surrey locality this year. I had flies under observation for some days, but I saw no attempt at oviposition.

On *Q. ilex*, L., *Eriophyes ilicis*, Can. This mite has now spread to a second tree in the Leatherhead district, and seems to be well established in its new situation.

On *Salix pentandra*, L., *E. triradiatus*, Nal. Now established on five of the trees near the windmill, Wimbledon Common, having apparently spread from some *S. fragilis* near, which are heavily galled.

On *S. triandra*, L. (1) *Rhabdophaga heterobia*, H. Low. Rosettes. (2) *Perrisia terminalis*, H. Low. (3) *Pontania bridgmani*, Cam. All three from Broadsands Bay, S. Devon.

On *S. fragilis*, L., *Eriophyes triradiatus*, Nal. A tree in Red Lion Square, Holborn, attacked by this species, was severely pruned some four years ago, but three small galls were left. The mite has spread over the tree again, and in October 83 galls were counted there.

On *S. purpurea*, L., ?*Rhabdophaga heterobia*, H. Low. Female catkin buds attacked and aborted. Barnes Common.

On *S. viminalis*, L., *E. triradiatus*, Nal. The colony on a tree in Gunnersbury has died out this year, as has that on *S. caprea*, L.

On *S. repens*, L., ?*Rhabdophaga heterobia*, H. Low. Female catkins attacked and aborted. Wimbledon Common.

On *Populus tremula*, L., *Perrisia populeti*, Rubs. Wimbledon Common, and elsewhere; plentiful this year.

On *P. nigra*, L., *Pemphigus bursarius*, L. Has been very scarce. *P. affinis*, Kalt., not recorded at all. *P. spirothecae*, Pass., only on three trees, a few. *P. marsupialis*, Courchet., only once seen. This seems remarkable as Aphides were so abundant generally.

On *Taxus baccata*, L., *Eriophyes psilaspis*, Nal., was found attacking the individual leaves as well as the buds, and causing torsion. Leatherhead.

On *Phragmites communis*, Trin., *Lipara lucens*, Meigen., was abundant last January at the Black Pond, Escher. Owing to the low level of the water it was possible to get well out among the reeds.

On *Molinia caerulea*, Moench., *Oligotrophus ventricolus*, Rubs. Stoke Common, Bucks, and Epping Forest.

On *Agropyron junceum*, Beauv., *Isosma graminicola*, Giraud. Paignton.

HAROLD J. BURKILL, Hon. Sec. and Recorder.

CHINGFORD BRANCH

THERE is nothing special to report in the Chingford Branch for 1923. The attendances at the meetings were a little lower than in 1922, the average being 29.76 against 30.75. The lowest was 18 and the highest 59. The falling off was entirely in the second half of the year, and may be attributed to the frequency of bad weather, the average for the first half of the year being 34.

The following lectures were delivered:—"Some Interesting Common Insects," by C. L. Withycombe, M.Sc.; "Lands End," by J. E. S. Dallas; "The Freshwater Fishes of London," by P. W. Horn;

"The Earth as It Was Before the Time of Man," by C. O. Harvey, B.Sc.; "Economic Ornithology," by H. H. Wardle, F.R.H.S.; "Bird Life in North-East London," by R. W. Pethen; "Sunshine and Its Influence on Living Plants; A Romance," by T. F. Harvey, F.I.C., F.C.S.; "The Fungi of Epping Forest," by F. G. Gould; and "The Gothic Architecture of London," by S. Leigh Hunt. In addition there was a visit to the Scout Master's Headquarters, at Gillwell Park, and an informal ornithological ramble in Epping Forest. Weather conditions prevented other outdoor excursions from being carried out.

The branch is greatly indebted to Mr. Ross for his interest in the work and for his services as lanternist on every occasion when the lantern is used.

E. SAMUELSON, *Secretary*.

THE MEDICO-ENTOMOLOGICAL RESEARCHES OF ARTHUR WILLIAM BACOT

By M. GREENWOOD, M.R.C.S., M.R.C.P.

Extract of a paper read on March 29th to the Society.

(A fuller account of the life work of Mr. A. W. Bacot has been prepared by Drs. Greenwood and Arkwright for the "Journal of Hygiene.")

ARTHUR WILLIAM BACOT was born in London on April 28th, 1866, the third son and fourth child of Edmund Alexander and Harriet Bacot.

The family is of Huguenot descent in the paternal line, and an account of some of the members will be found in Samuel Smiles' book, "Huguenots in England and Ireland" (p. 481). In physique Arthur Bacot showed traces of his descent. He told me that on his first continental trip his companion would address a passer-by in voluble but Anglicised French, while he himself, not having the gift of tongues, stood silent. Sooner or later there would come a conversational deadlock, the Frenchman would look round in despair and, catching sight of Bacot, his face would light up, he would begin a fluent discourse only to be plunged into deeper gloom by the discovery that this too was an Englishman.

Several of Bacot's ascendants and collaterals were members of the medical profession; his great uncle, John Bacot, served with distinction in the Peninsular War, and was the author of a treatise on Venereal Diseases, published in 1829. An older member of that generation, Frederick Bacot, a young Army Surgeon, fell at Seringapatam.

As a child, Arthur Bacot was delicate and often ailing, although he was proficient at most outdoor sports, an excellent swimmer and skater (as a man he was a first rate skater, and passed the speed tests of the National Skating Association) by his eleventh year. His delicacy, called at the time "Anaemia of the Brain," was perhaps what we should now call psychoneurotic. All the children were, as Miss Bacot tells me, introspective and sympathetic to animals, a tendency encouraged and shared in by their father. Whatever we may think of its aetiology, the psychological condition led to great irregularity of school attendance, and had important consequences in after life.

Psychologists tell us that the experiences of childhood are far more potent in determining what we shall become than anything which happens afterwards, and certainly many of Bacot's characteristics, both

trivial and important, can be very plausibly related to his childish experiences. To begin with a trivial point, which, trivial as it was, impressed all his associates, he retained into manhood most of the likes and dislikes of the average delicate child in eating and drinking. He enjoyed at the age of fifty what a boy of five enjoys, and it was a melancholy thing to sit next to him at a "grown up" dinner of many courses. He was also very irritating to folk who dieted themselves on principle. To such, a man who wore no hat and lunched off bread and jam, cheese and chocolates seemed a long lost brother, and they were very cross when they found he was not a vegetarian, in fact enjoyed roast chicken, and had no conscientious scruples against keeping a hat in his city office (he did it, he told me, because bank cashiers and city shopkeepers with tills got nervous if a hatless man came in). They failed to perceive that he did, or abstained from doing, trivial things not on principle but because he had retained the tastes of a boy.

This was a trifle, more significant were two consequences.

Being often away from school and therefore thrown on his own resources, the introspection of a child, the faculty of weaving romances out of common things was strengthened by practice, and was perhaps the basis of Bacot's powers of sympathetic imagination. His attitude towards birds and beasts retained something childish—in the good sense—to the end. He never canted, he did not call them his "little brothers," neither did he adopt the intellectual manner of the school-master abroad, or treated fleas as the nicely educated young man is apt to treat a boy's brigade.

The other consequence was that he was cut off from all chance of escaping from his economic environment by the usual methods. He was too irregular in attendance to get the best out of the school. He left school with no knowledge of foreign languages, and without such knowledge of the orthodox branches of science as might have enabled him to compete with hope of success for grant earning "Science and Art" certificates, or for a scholarship at the Royal College of Science.

Bacot's difficulty in acquiring languages was not wholly due to an irregular early education. His visual memory was innately more powerful than his auditory memory; it was always remarkable that while he received and interpreted visual stimuli without seeming to attend to them, no effort of voluntary attention enabled him to retain unfamiliar pronunciations.

He also seemed to have difficulty in expressing himself clearly on paper, though in conversation he was a brilliant talker.

Bacot's initiation to the study of natural history only differed from that of any boys blessed with intelligent parents and brothers in its early date. He started butterfly hunting at five, and his sister recollects that at the age of six the child was saddened by his kindergarten mistress' ignorance of butterflies and caterpillars.

Bacot's delicate health kept him out of the city until he was sixteen, but after that he was employed for the next twenty-seven years in a city office. He joined the local Natural History Society (now the London Natural History Society) and some years later joined the

Entomological Society of London. It would not be easy to imagine external conditions less propitious for the development of scientific ability, but between 1893 and 1909 he published more than fifty separate papers, and contributed largely to Tutt's monumental treatise on the British Lepidoptera.

Bacot's first published contribution to natural history was a note on the variation of *Saturnia carpinii*, printed in the "Entomologist's Record" of 1893 (vol. iv., p. 199). His first long paper was read to the City of London Entomological and Natural History Society in 1895, and printed in the "Entomologist's Record" (vi., 173-181). It dealt with the genus *Smerinthus*, and the technical problem which he desired to solve was the relation of the genus to allied genera.

Bacot contributed to the tenth volume of the "Entomologist's Record" a complete morphological study of the British Liparid Moths; it is perhaps the most compact of his morphological studies, in the precise and methodical description of the larval stages, is a good example of what may be called the school of Chapman. The late Dr. T. A. Chapman, one of the most distinguished Lepidopterologists of our time, had an important influence on Bacot's scientific development; their long friendship was without a break and their scientific collaboration close.

From the date of his first publication to his initiation to medical entomology Bacot's interests were balanced between morphological and genetic research. Undoubtedly the latter appealed more to him, but he probably devoted more time to the former, thereby acquiring a technical dexterity in the manipulation of small objects, and a power of exact description, which were to prove of great value to him later.

Bacot's last important contribution to pure lepidopterology was, however, concerned with genetics; this was the paper by Bacot and Prout communicated to the Royal Society in 1909. Bacot's chief published work on pedigree breeding had been done on *Lasiocampa quercus* and *Triphoena comes*. In the former species he had found that two races from the same geographical region when crossed produced progeny which segregated into the parental forms, but that this did not occur when the southern French variety, *meridionalis*, was crossed with the Scottish variety, *callunae*.

Bacot and Prout carried out further experiments with a Geometrid moth, *Acidalia virgularia*, carried on for ten generations, involving the examination of over five thousand specimens that had been bred.

The joint research with Prout was Bacot's last important contribution to pure lepidopterology; the main stream of his intellectual life was soon to be diverted.

Before the publication of the research on *Acidalia*, Bacot had made the acquaintance of some prominent workers in the field of scientific medicine. He had been introduced to Prof. Leonard Hill and Prof. Bulloch, and, in 1908, gave an account of his breeding experiments in the Physiological Theatre of the London Hospital Medical College, one of a course of lectures on heredity in which members of the College staff collaborated. This was the first time he addressed a medical audience.

In 1909, I was employed by the Advisory Committee for Plague Investigations to analyse statistics of plague incidence; this commission and my appointment to the staff of the Lister Institute at the end of 1909, brought me into touch with the principal workers on the subject, Lamb, Liston, Boycott, C. J. Martin, Ledingham, and Rowland. I discussed questions of plague with Bacot, and used to bombard him with questions about the ways of fleas, and he would suggest possibilities of bridging over gaps in our knowledge.

Within a few months our conversations had a practical result. I learned that the Advisory Committee were looking for someone who could study the rat flea from other aspects than the morphological, and introduced Bacot to Prof. C. J. Martin.

The gulf between the certificated professional and the amateur is not so wide in England as elsewhere, still it exists. Obviously no committee administering public funds could have been expected to invite a man of 44, whose name was unknown outside a narrow circle, to throw up his means of living and become a wholetime investigator. All that could be done was to invite Bacot to take up the study of fleas in his spare time, the Committee to bear all expenses and pay an honorarium. The terms offered by the Committee were liberal, but Bacot feared that time was lacking. However, after a little hesitation, he accepted the proposal. An R.A.M.C. reservist was sent down to Loughton, and with his help—he proved to be an ideal assistant—Bacot turned a derelict stable into a laboratory, collected some apparatus and a few fleas and set to work.

The time at Bacot's disposal was from seven in the evening to eight in the morning, five days a week; five hours more on Saturdays and such parts of Sundays as I could not induce him to devote to forest walks. In this time he had to conquer all the difficulties of a new technique unguided by the experience of others. The difficulties of his main research were sufficiently great, but in this he had only the same kind of obstacle to surmount as in the breeding experiments on moths, from which he had learned much. But, as a side line, he took up the tracing of an infection from one stage of life history to another, working with the house fly and *Bacillus pyocyaneus*. The tyro in a properly equipped laboratory is familiar with the difficulties of pure culturing. In an old wooden stable the omnipresence of moulds makes the work exasperatingly difficult, particularly if one has to discover for oneself all the little manipulations which the more fortunate student has demonstrated to him by a teacher.

The first results were published in 1911. More appeared in 1914.

Questions had been put forward by the Advisory Committee. These were answered fully by Bacot. He worked out the various points of each problem with a careful attention to detail that ensured the success of the different experiments that he made during his researches. The most valuable section of the memoir is that which deals with the effects of varying physical conditions on the length of the larval and cocoon stages.

The first draft of the report on the bionomics of rat fleas was Bacot's

Habilitationschrift, and admitted him to the circle of recognised research workers. In December, 1911, he was appointed Entomologist to the Lister Institute of Preventive Medicine, and began work there a few months later.

The two years and six months ending in August, 1914, were a time of perfect happiness for Bacot. The Lister Institute was an ideal home for him. Of course he would have been happy and respected in any society of intelligent human beings, but the staff of the Lister were precisely the kind of people to suit him. All of them had enjoyed a more regular scientific training than he, but they had been trained in different schools, and many of them had seen much of the world, so there was none of that donnishness which is apt to make the entrance of an "outsider" into the society of men all educated on the same lines a little irksome.

For the first time in his life Bacot had command of good tools, and learning how to use them was a perfect joy. I think the tool that gave him most pleasure was a Zeiss binocular dissecting microscope, and with Minchin for his instructor his progress was rapid. In ordinary microscopy he soon became expert. Most students will know the value of a compliment I once heard C. J. Martin pay. He said, "Bacot never sees what isn't there."

Bacot had plenty of interests outside his laboratory, or rather the habits of his mind which gave him pleasure in his laboratory found happiness everywhere. He had a very good time at Loughton. Demographically it is a London suburb, inhabited by a fair random sample of middle class people. We are not really such mercenary fools as "Punch" artists and didactic novelists make out, but we do think that the owner of a Rolls-Royce is usually better worth cultivating in a social way than the push cyclist. We feel that a bearded, hatless man, who strides past our parish church on Sunday morning at the hour of early Communion, pushing an exceptionally noisy wheelbarrow charged with manure, is not normal. When this disturber of the Sabbath peace also supports the most extreme "socialistic" doctrines in a local debating society, those who know us only through literature, would not expect him to be popular. But the practical justification that Bacot's life provided for what we regarded as his eccentricities was accepted. A neighbour of mine said that Loughtonians fell into two classes—those who got on with Bacot, and those who didn't. I have not been able to identify half a dozen members of the latter class. Perhaps, after all, we are subtle enough to distinguish between selflessness and affectation.

The volume of the "Journal of Hygiene" which contained Bacot's revised memoir on the bionomics of the rat fleas, also contained the paper by himself and C. J. Martin on the mechanism of infection. To this paper the frequently abused term classical may fairly be applied.

As long ago as 1897 it had been inferred by Ogata that the flea was implicated in the spread of the plague. Simond, in 1898, performed experiments which indicated that rats could be infected by fleas, and his work was confirmed and extended by Gautier and Raybaud in

1902-3, and Verjbitski in 1904. The workers of the Commission for the Investigation of Plague in India (1906-7), proved that fleas were the chief and perhaps the only means of transmission, but were unable to decide what was the precise mechanism. Bacot and Martin set out to ascertain whether infection could be conveyed by the act of sucking. Fleas were fed on infected mice and then allowed to bite clean rats under conditions which precluded the contamination of the rat's skin with the excreta of the flea. It soon appeared that infection could be conveyed in this manner.

This brilliant investigation is no doubt the one by which Bacot's name will be most familiarised to the scientific public. Self evidently the credit for its planning and execution is only in part his, while the literary form of the paper is the work of a more skilful writer.

Two other papers of this period have to be mentioned as of importance to the student of epidemiology. Bacot's "Observations on the Length of Time that fleas carrying *Bacillus pestis* in their alimentary canals are able to survive in the absence of a host and retain the power to re-infect with plague," are of much interest.

It was experimentally proved that an infected fasting flea could continue to transmit disease after an interval of more than six weeks. Whether this were the maximum could only be determined by a very long series of experiments; actually in Bacot's series no success was scored after a longer interval.

The other paper was on the survival of bacteria in the alimentary canal of fleas during metamorphosis, and is an application to the flea of the principle involved in Bacot's first printed medico-entomological paper. In no case was Bacot able to demonstrate the persistence in the imago of an infection acquired in the larval stage, a result in rather striking contrast with the success won by himself, by Ledingham, by Graham-Smith, and by Nicholls, in contaminating adult diptera by infection in the larval stage.

In South-East Suffolk, in 1906-7, large numbers of dying rats were noticed. Then in January, 1907, six people out of eight in one house died from what seemed to be pneumonia. Three years later, in the same district, five persons out of eight in one house died within a few days of each other. It was said that the dwelling was infested with fleas, but no suspicion was aroused that there was any connection between them and the deaths. Four more similar deaths occurred in the middle of September, 1910, within a mile of the place where the dead rats had been noticed. Suspicion was now aroused, and on examination several plague stricken rats were found. A sailor died in 1911 in Shotley barracks, with similar symptoms to those of the former victims. In 1914 plague bacillus was detected in ferrets, rat, and a rabbit, but no deaths occurred among the human population until 1916, when there were two more. The epizootic lasted apparently for twelve years, but yet was only responsible for eighteen human deaths during that period. Why? Had Bacot had the opportunity to investigate he might have found the explanation.

It is highly probable that the substitution of the brown for the black

rat has been an epidemiological advantage; but the brown rat did not reach England (apparently in or about 1828) until a generation after the extinction of plague as a reigning epidemic.

Bacot's opinion was that success depended upon an adjustment of small details, only to be ascertained by a minute study of natural conditions, by attending to the ways of beasts and insects in the field. It was planned that he should undertake such a study of East Anglia. The late Dr. Bruce Low was particularly anxious that he should do this. But more urgent work had to be performed, and it is idle to speculate whether he would have discovered anything. Still one regrets that he did not have the opportunity to look into the matter at the time of the last human cases.

Bacot published three other memoirs, inspired by his association with the work of the Advisory Committee on Plague. One deals with the practical value of vapours as insecticides. He concluded that naphthalene was the most generally effective agent for the destruction of fleas in all stages of their life-history. A second, written in collaboration with the late Dr. W. G. Ridewood, is an exact morphological study of flea larvae. The third paper deals with the mechanism of infection with plague by bugs.

Bacot, like Verjbitski, succeeded in infecting rodents by the bite of bugs, and he gives a careful account of the mechanism. He found that a meal of septicæmic blood was fatal to newly hatched larvae, but that an adult was capable of re-infecting a mouse after forty-eight days' starvation. The paper is also, I think, of interest from the biographical point of view in its improvement in form; he never became an attractive writer, but his more recent papers are better knit together than his earlier ones.

This work filled Bacot's time from his appointment to the Lister Institute to the summer of 1914.

In the summer of 1914 he proceeded to West Africa to study the bionomics of mosquitoes and their connection with yellow fever. He spent just over a year in Freetown, and the results of his investigations there are contained in the Report published by the Yellow Fever (West Africa) Commission. He first started to study with his usual thoroughness the eggs of mosquito, *Stegomyia fasciata*, and he carried out a large number of experiments and a long series of observations on them. Each question that cropped up was fully dealt with, and the result was a large mass of information concerning the breeding and life of the insect in its different stages. He showed that the hatching of eggs cannot normally occur in sterile water, so that the ordinary methods of purification of water from bacteria will be of service in the reduction of the mosquito population.

A very good judge, Prof. A. E. Boycott, thinks that it is by this beautiful research Bacot would wish to be remembered.

Bacot's war work began immediately after his return from West Africa. He had been busy with lice for some months when he wrote to me (on February 1st, 1916)—“I am still working out the lice, it is a slow itching drudgery but quite interesting in its way. I must say

that I wonder the troops put up with it. I should scratch on parade—but perhaps the men do.”

Bacot dealt with lice exactly as he had treated fleas and mosquitoes. He adapted his experimental methods to suit the subjects; he did not confine his experiments to those subjects which happened to survive some technique convenient for the experimenter. His war-time publications were numerous but mostly short practical notes. The fullest account of his work is given in a paper read by him to the Section of Epidemiology and State Medicine of the Royal Society of Medicine in 1918.

Bacot summarised the bionomic characters of lice which are of sanitary importance in various propositions, the truth of which he established by a long series of experiments.

He considered the most suitable method of de-lousing clothes was, wherever practicable, by exposure to dry heat. He found that exposure to 55°C. for thirty minutes was ample for the destruction of both nits and adults.

He devised a method of accurately testing the efficiency of insecticides and employed it in a long series of experiments. Of quickly acting remedies naphthalene proved the best. It should be used in conjunction with an emulsifying agent.

Bacot, as Honorary Consulting Entomologist to the Army Medical Department, was able to prevent a good deal of waste of money and more disappointment. Insecticides and vermin killers fell to his lot for judgment, rejection or acceptance.

Most of Bacot's time between 1916 and 1918 was devoted to the subject of the prevention of lousiness, but before the end of the war he had begun work upon the aetiological role of the louse in disease transmission. In the first instance his attention was specially directed to Trench Fever; from 1919 to the end he specialised in Typhus.

Dr. Arkwright has described the scientific work which occupied the last years of Bacot's life. There only remains to add a few words on personal aspects. Bacot suffered not less than the rest of us from the post-war reaction; he had never indeed cherished dreams of a new heaven and earth to follow victory, but his temperament was not that of the prophet who can draw comfort from the fulfilment of his forebodings. I think he suffered much, and his comments upon public affairs were bitterer than before. But he was not unhappy, for he never lost the key of fairyland given him in 1911.

His visit to Poland in 1920 was not, for various reasons including an attack of Trench Fever, an agreeable one. His last journey began under happier auspices. His letters from shipboard were in his earlier vein. The voyage down the Mediterranean delighted him; the laboratory and colleagues at Cairo were thoroughly congenial, and the last letter I was to have from him the most cheerful of all. That letter was written on March 24th, 1922. Within a few days he was taken ill. An oblivion soon followed. In his delirium he spoke only of the research. On April 12th he died. His body was carried to the grave, in the British Cemetery of old Cairo, by his friends and colleagues from the Laboratories, both British and Egyptian.

Bacot cannot live for future generations as John Ray and Gilbert White live; he has left behind no book which will charm by its literary quality after the discoveries it records have become incorporate in the general stock of knowledge. But his personal influence will not die with him. Those who worked beside him, and loved him, will often be restrained in moments of petulance by a memory of some act of kindness, by a recollection that a great researcher could be as selfless as a child. Any scientific man tempted to measure his own services against their rewards in income or fame, may pause to think how little made this man happy.

BACOT MEMORIAL EVENING

In response to a desire on the part of many members, the Council has decided to perpetuate the memory of our distinguished late colleague, Mr. Arthur W. Bacot, by dedicating to that purpose the second meeting in April, which is that nearest to the anniversary of his death. This meeting will be described annually on the syllabus as the "Bacot Memorial Evening."

NOTES ON COLLECTING IN 1923

By E. A. COCKAYNE, M.A., D.M., F.R.C.P., F.E.S.

Read before the Society on November 6th, 1923.

THE first observation of interest was made at our Field Meeting on Wimbledon Common, on April 8th. On a small clump of low birches we found thousands of *Lycia hirtaria*. I counted 50 on one small trunk and 38 on one side of another within two feet of the ground. Although they were not so numerous on every trunk, many were quite as crowded. On some trees they sat with wings overlapping, and I saw a newly emerged female, in its effort to find a foothold, set eighteen more in motion before it was successful. Most of the available cracks were full of eggs and females were laying on the smooth bark. Indeed one was depositing a batch of eggs between the fore- and hindwing of another. We saw comparatively few elsewhere on the common. The birches, on which they swarmed, have been surrounded by huts erected during the war, and only recently demolished. These may have protected them from birds. I have always thought that the abundance of this species in large towns such as Leeds and London, is due to the absence of some birds, which prey on them in the open country.

Looking for varieties I found a pair of unusually pale ones, the male being particularly striking, and three melanic ones. The male, unfortunately worn, has a pale subterminal line, but the rest of the insect is so heavily dusted with black scales that no other markings are visible. The two females are not quite so dark, but are much blacker than any I have seen in previous years.

Before leaving the subject of *hirtaria* I should like to record an olive green larva marked on each segment with large whitish patches slightly tinged with green. It was beaten from ash at Horsley. I have never met with this form before although I have had many hundreds of London larvae.

A box of sawfly catkins, gathered by my mother in East Aberdeenshire, produced about 200 larvae of *Eupithecia tenuiata*, 120 *Xanthia* larvae, chiefly *lutea*, with some *fulvago* and a few *circellaris*, five *Ypsipetes elutata*, and one *Oporabia dilutata*. Thirty-seven typical *fulvago* and six var. *flavescens* emerged. The result was disappointing, because *flavescens* is said to be very common further down the coast at Montrose.

The prolonged spell of cold weather in May and June seemed to exert an adverse influence on the whole season. I think most of us

will agree that even the commonest species, especially the Geometers, with few exceptions, were very scarce. Unfortunately I chose May for my holiday in south Cornwall, and it was quite spoilt by cold winds, fog, and rain.

Larvæ of *Lasiocampa trifolii* were locally common along the coast, and were fond of resting during the day on the top of the weather beaten cushions of heather and the stunted gorse bushes. They feed chiefly at night, but two were seen in the day time eating a species of *Aira*. Barrett states that it was a common species on the Cornish coast in 1845, but has become scarce or disappeared altogether. Many larvæ died, but about thirty imagines were bred, all very dark coloured. They are much darker than my specimens from the Lancashire coast.

The most interesting insect met with was *Pararge megera*, but it was getting past its best and I took no interest in it until too late. Specimens of both sexes with extra spots were very common. I think one out of every three or four had one or more extra spots, whereas in Lincolnshire the proportion is one in 50 or 60. On the forewing of normal *megera* there is a tiny spot in cell 6, and a large ocellated one in cell 5, the posterior part of which encroaches on cell 4. In some of my specimens this spot has a second ocellus in cell 4. In one female this spot is so large that it spreads over into cell 6 in front and touches nervure 4 behind.

I regard the spots with two ocelli as fused double spots, and I think the following facts prove it. In some specimens the spots are seen to be partially separated, and one female with a small ocellated spot in cell 5 has another small one in cell 4, widely separated from the first. In several males, and in one or two females, there is a spot with ocellus in cell 3; in others this is represented by a mere dot. One female has an additional blind spot in cell 2. The hindwing shows the same tendency. In addition to the usual ocellated spots in cells 1, 2, 3, and 4, some have a small blind spot in cell 5, on one or both sides.

It is well known that an increased number of spots is common in *Epinephle tithonus*, and to a less extent in *P. jurtina* in Devon and Cornwall, but I was not aware that it occurred in *P. megera*. *Megera* with this peculiarity are commoner in Ireland than in the East of England, and *jurtina* may have the normal spot increased in size, or there may be additional spots. One wonders how much the spotting is influenced by the climate.

Dr. Jordan's discovery of *Anaitis efformata* as a common English species stimulated me to look for it, in the hope of breeding it and *plagiata* side by side. The cold spring prevented this. Only a single male of each was caught, and no female of either.

In August I found *efformata* plentiful in the Chilterns and at Horsley. Eggs were laid freely on *Hypericum perforatum*, usually singly, but sometimes in pairs, on the petals, sepals, and small leaves. They are pale cream in colour, smooth, ovoid and flattened on the side by which they are attached. The newly hatched larva is long and thin, whitish with a narrow blackish dorsal and subdorsal line, and another interrupted line below the spiracles. It has a narrow white

collar. The head is pale yellowish-brown with a black spot on the lower part of each lobe and black mandibles. The legs are speckled with black. The larvae fed readily on perforated St. John's Wort. In their third instar they were chocolate or putty coloured with the dark markings showing very indistinctly. At this stage they died, although kept out of doors on growing plants. The chief differences between *efformata* and *plagiata* are the smaller size, more indistinct markings and shorter abdomen of the former. The male *plagiata* has long narrow valves, whereas in *efformata* they are short and blunt. The difference in the genitalia, which is obvious to the naked eye, is even more striking in microscopical preparations.

The geographical distribution of the two species is still uncertain. *Efformata* occurs in Kent, Hants, Dorset, Surrey, Oxfordshire, Bucks, and Herts, but I do not think it extends very far north. All my specimens of *Anaitis* from Rannoch and Sheffield are *plagiata*, and so are those which I have seen in other collections from the North of England and Scotland. In Surrey and Bucks *efformata* appears to be much the commoner species. Yet before Dr. Jordan's discovery most collections contained very few examples of it. I suppose this is due to the careful selection of large and well marked specimens for the cabinet.

PRELIMINARY OBSERVATIONS ON THE BRITISH VANESSIDS

ON April 17th, 1923, Mr. H. B. Williams read a paper on this subject. Following a few general observations on the British species and their distribution, the paper dealt with two subjects in detail, the method of pupation and the parallel and convergent variation of *Aglais urticae* and *Vanessa io*. Dealing with the first subject the lecturer referred to the errors of Réamur and Buckler, and drew attention to the careful work of Osborne, Edwards, and the late Dr. Chapman, by which the method of suspension of the insect during the critical moments of pupation was solved. It appeared that no satisfactory explanation of the method by which the newly exuded pupa, after withdrawing its tail from the larval skin, rises to the pad of silk to which it is finally attached, in apparent defiance of the laws of gravitation, had yet been forthcoming. The second portion of the paper dealt with the markings of the two species referred to in detail, and with the relationships of such forms as *Vanessa io* ab. *informis*, Rss., and it was suggested that the facts pointed to the probability of *V. io* having developed from a "tortoiseshell" facies, with some resemblance to *Aglais urticae*.

Mr. Williams' paper has appeared in full in "The Entomologist's Record" for 1923, so that journal should be consulted for further particulars.

THE BIRDS OF EPPING FOREST

A SUMMARY OF EIGHT ANNUAL REPORTS

THIS list comprises all the species recorded in eight annual reports, embracing a period from 1916 to 1923 inclusive.

With the exception of 1923, which was compiled as usual, although not printed, the reports were published annually in the society's Transactions. In the course of the eight years' work 98 forms have been identified. Of this number 61 have nested at some time or other, 55 regularly. A division of the total number of forms into categories according to their movements, shows that 89 are residents, 18 summer visitors, 15 winter visitors, 2 passage migrants, and 24 unplaced. Of the unplaced birds twelve are included on the strength of one occurrence.

The status of each form is based on the accumulated evidence of the eight annual reports.

It will be assumed that the descriptions, resident and summer visitor, connote breeding, unless otherwise stated.

The almost negligible number of passage migrants and the very few rarer birds which have been recorded, indicate that there is very little migration across the area. The regularity of the bird-life is a feature which the collation of the various reports renders prominent. To the student of birds Epping Forest's period is that of spring, when the wood is tenanted by the many summer visitors. A walk through the glades amidst the wonderful chorus, on a May morning, is an experience which is not easily forgotten.

A strong plea is made for a much stricter measure of protection for the birds, especially during the nesting season.

The intention of accepting records only from the land under the control of the Corporation of the City of London, as stated in the original introduction, has been carried out, so it may be claimed that the list is a guide to the birds of what is known to-day as Epping Forest.

CARRION-CROW (*Corvus c. corone*, L.).—An increasing resident.

HOODED CROW (*Corvus c. cornix*, L.).—One occurrence, November, 1919.

ROOK (*Corvus f. frugilegus*, L.).—An irregular visitor throughout the year. Only rookery, Wanstead Park, which is decreasing.

JACKDAW (*Corvus monedula spermologus*, Vieill.).—Resident. Breeding stations, High Beach Church and Warren Hill.

MAGPIE (*Pica p. pica*, L.).—A very rare visitor. Recorded in 1917, 18 and 20.

BRITISH JAY (*Garrulus glandarius rufitergum*, Hart.)—An abundant resident, not decreasing.

STARLING (*Sturnus v. vulgaris*, L.).—A common resident. Woodpecker holes are often used as nesting sites, apparently without adverse influences on these species.

GREENFINCH (*Chloris c. chloris*, L.).—A resident, which is common as a winter visitor, but much less so in nesting season.

HAWFINCH (*Coccothraustes c. coccothraustes*, L.).—A not uncommon resident. The presence of this species in numbers is a strong feature of the bird-life, the abundance of the hornbeam being the probable cause.

BRITISH GOLDFINCH (*Carduelis carduelis britannica*, Hart.).—A regular, but scarce, winter visitor.

SISKIN (*Spinus spinus*, L.).—An annual winter visitor to the alders at Highams Park Lake.

HOUSE-SPARROW (*Passer d. domesticus*, L.).—A plentiful resident in suitable places.

TREE-SPARROW (*Passer m. montanus*, L.).—An uncommon resident. Nesting stations, Chingford Wood, Barn Hoppit, and Warren Hill.

CHAFFINCH (*Fringilla c. coelebs*, L.).—A very common resident.

BRAMBLING (*Fringilla montifringilla*, L.).—A sparing winter visitor, but very common in some years, as 1922-3, when food supply was abundant.

LINNET (*Acanthis c. cannabina*, L.).—An uncommon forest bird, recorded as nesting.

LESSER REDPOUL (*Acanthis linaria cabaret*, P. L. S. Mull.).—A common winter visitor, usually found on the birches and alders. An occasional pair may stay to nest.

BRITISH BULLFINCH (*Pyrrhula pyrrhula nesa*, M. and I.).—A common resident.

YELLOW HAMMER (*Emberiza c. citrinella*, L.).—A not very common resident on the open spaces.

REED-BUNTING (*Emberiza s. schoeniclus*, L.).—Chiefly a winter visitor, to be found where there are tracts of the grass, *Molinia varia*. Had almost entirely disappeared in 1922, which fact may have some association with the drought of 1921. Normal status regained in 1923.

SKY-LARK (*Alauda a. arvensis*, L.).—A common resident on the plains.

WHITE WAGTAIL (*Motacilla a. alba*, L.).—One record only, in 1921.

PIED WAGTAIL (*Motacilla a. yarrellii*, Gould).—A less common resident. In some winters parties, running into hundreds, come in to roost for the night among the reeds round the ponds.

GREY WAGTAIL (*Motacilla c. cinerea*, Tunst.).—A scarce winter visitor, regularly so to the Sewage Farm, Hatch Plain.

YELLOW WAGTAIL (*Motacilla flava rayi*, Bona.).—One record, April, 1920.

TREE-PIBIT (*Anthus t. trivialis*, L.).—A common summer visitor to the open spaces. Average date of arrival April 14th.

MEADOW-PIBIT (*Anthus pratensis*, L.).—A regular but decreasing winter visitor.

BRITISH TREE-CREEPER (*Certhia familiaris britannica*, Ridg.).—A well established resident.

BRITISH NUTHATCH (*Sitta europaea affinis*, Blyth).—A resident, mainly recorded from Hill Wood.

BRITISH GOLDCREST (*Regulus r. anglorum*, Hart.).—A common winter visitor. After the severe winter of 1917 the numbers of this species were seriously reduced. The normal status was regained by 1920.

BRITISH GREAT TITMOUSE (*Parus major newtoni*, Prazák).—An abundant resident.

BRITISH COAL TITMOUSE (*Parus ater britannicus*, S. and D.).—A common resident.

BRITISH MARSH TITMOUSE (*Parus palustris dresseri*, Stej.).—A common resident.

BRITISH BLUE TITMOUSE (*Parus caeruleus obscurus*, Prazák).—An abundant resident.

BRITISH LONG-TAILED TITMOUSE (*Aegithalos c. caudatus roseus*, Blyth).—A common resident. No diminution in numbers was noticed after the severe winter of 1917.

GREAT GREY SHRIKE (*Lanius c. excubitor*, L.).—One occurrence, winter 1919-20.

RED-BACKED SHRIKE (*Lanius c. collurio*, L.).—A not uncommon summer visitor. Frequents the open spaces. Average date of arrival May 10th.

SPOTTED FLYCATCHER (*Muscicapa s. striata*, Pall.).—A not uncommon summer visitor. Average date of arrival May 13th.

WHITETHROAT (*Sylvia c. communis*, Lath.).—A common summer visitor. Average date of arrival April 24th.

LESSER WHITETHROAT (*Sylvia c. curruca*, L.).—A fairly common summer visitor. Average date of arrival May 1st.

GARDEN WARBLER (*Sylvia borin*, Bodd.).—A common summer visitor. Average date of arrival May 6th.

BLACKCAP (*Sylvia a. atricapilla*, L.).—A common summer visitor. Average date of arrival April 23rd.

GRASSHOPPER WARBLER (*Locustella n. naevia*, Bodd.).—Recorded in 1921 only. No nest found.

REED-WARBLER (*Acrocephalus s. scirpaceus*, Hermann).—Only one occurrence, June 2nd, 1920.

WILLOW-WARBLER (*Phylloscopus t. trochilus*, L.).—The most numerous summer visitor. Average date of arrival April 9th.

WOOD WARBLER (*Phylloscopus s. sibilatrix*, Bech.).—A local summer visitor, probably increasing. Average date of arrival May 2nd.

CHIFFCHAFF (*Phylloscopus c. collybita*, Vieill.).—A common summer visitor. Average date of arrival April 4th.

MISTLE-THRUSH (*Turdus v. viscivorus*, L.).—A fairly common resident.

BRITISH SONG-THRUSH (*Turdus philomelos clarkei*, Hart.).—A very common resident, but scarcer in winter.

REDWING (*Turdus musicus*, L.).—A winter visitor. The appearance of this species is controlled by the food supply, and consequently its movements are very uneven. For example, 1922 was a notoriously good fruit year and redwings were strikingly numerous. On the other hand 1923 was as bad a fruit year as 1922 was good, and redwings were almost entirely absent.

FIELDFARE (*Turdus pilaris*, L.).—A winter visitor, but much less numerous than the redwing. The remarks on the movements of the redwing also apply to the fieldfare.

BLACKBIRD (*Turdus m. merula*, L.).—A common resident. Numbers very much increased in winter.

REDSTART (*Phoenicurus p. phoenicurus*, L.).—A common summer visitor. The many nesting-holes provided by the pollard trees are probably the reason of the prevalence of this species in the Forest. Average date of arrival April 17th.

BRITISH REDBREAST (*Erithacus rubecula melophilus*, Hart.).—An abundant resident.

COMMON NIGHTINGALE (*Luscinia m. megarhyncha*, C. L. Brehm).—A common summer visitor. If the volume of song can be taken as a guide, the numbers of this species vary from year to year. Average date of arrival April 22nd.

BRITISH STONECHAT (*Saxicola torquata hibernans*, Hart.).—Recorded twice. Nested in 1921, and 2 ♂s and 1 ♀ recorded from Fairmead Bottom, on September 29th, 1923.

WHINCHAT (*Saxicola r. rubetra*, L.).—A scarce spring and autumn bird of passage.

WHEATEAR (*Oenanthe o. oenanthe*, L.).—A scarce spring and autumn bird of passage.

BRITISH HEDGE-SPARROW (*Prunella modularis occidentalis*, Hart.).—A common resident.

WREN (*Troglodytes t. troglodytes*, L.).—An abundant resident.

SWALLOW (*Hirundo r. rustica*, L.).—A summer visitor, not too common, but more so at time of autumn migration. Average date of arrival April 20th.

MARTIN (*Delichon u. urbica*, L.).—As swallow. Average date of arrival May 3rd.

SAND-MARTIN (*Riparia r. riparia*, L.).—An occasional bird may be seen during the summer.

BRITISH GREAT SPOTTED WOODPECKER (*Dryobates major anglicus*, Hart.).—A common resident, probably increasing. The prevalence of this handsome species is a feature of the Forest.

BRITISH LESSER SPOTTED WOODPECKER (*Dryobates minor comminutus*, Hart.).—A well represented resident, although less numerous than the great spotted.

GREEN WOODPECKER (*Picus viridis virescens*, C. L. Brehm.).—A common resident, more partial to the open spaces than the other two woodpeckers.

WRYNECK (*Jynx t. torquilla*, L.).—Only records two occurrences at end of April, 1918.

CUCKOO (*Cuculus c. canorus*, L.).—A common summer visitor. Average date of arrival April 21st.

SWIFT (*Micropus a. apus*, L.).—A summer visitor, but no nesting localities known. Average date of arrival May 6th.

NIGHTJAR (*Caprimulgus e. europaeus*, L.).—A very local summer visitor. Average date of arrival May 10th.

KINGFISHER (*Alcedo atthis ispida*, L.).—A resident, but not numerous, more often seen in winter.

BARN-OWL (*Tyto a. alba*, Scop.).—Recorded twice, in January, 1916, and February, 1922.

BRITISH TAWNY OWL (*Strix aluco sylvatica*, Shaw).—A common resident.

LITTLE OWL (*Carine noctua mira*, Witherby).—Recorded once only, September, 1921.

SPARROW-HAWK (*Accipiter n. nisus*, L.).—Decidedly scarce. Recorded as nesting successfully in 1921.

KESTREL (*Falco t. tinnunculus*, L.).—Regularly hunts in the Forest, but apparently nests outside. One nesting record reported near Theydon golf links, June, 1923.

MUTE SWAN (*Cygnus olor*, Gmel.).—The Forest swans must be described as wild birds. Nesting localities, Highams Park lake and Barn Hoppit pond.

MALLARD (*Anas p. platyrhynchos*, L.).—A common resident, with much augmented numbers in winter.

TEAL (*Querquedula c. crecca*, L.).—One record, one seen by Keeper Stubbs on Strawberry Hill pond, August 7th, 1923.

SHOVELER (*Spatula clypeata*, L.).—One record, one seen by Keeper Stubbs on Strawberry Hill pond, September 3rd, 1923.

POCHARD (*Nyroca f. ferina*, L.).—A winter visitor recorded every year to and including 1921, but not since.

TUFTED DUCK (*Nyroca fuligula*, L.).—A winter visitor. One nesting record in 1916. This species has entirely disappeared from Connaught Water, where it was seen regularly in 1916 in flocks up to 50. It is still recorded in numbers from Wanstead.

HERON (*Ardea c. cinerea*, L.).—The Wanstead Park heronry provides the most important feature of the bird-life of the woodland. Number of nests per annum :—1916, 72 ; 1917, 60 ; 1918, 56 ; 1919, 54 ; 1920, 58 ; 1921, 69 ; 1922, 61 ; 1923, 58.

WOODCOCK (*Scolopax r. rusticola*, L.).—A scarce winter visitor.

JACK SNipe (*Lymnocyrtus minimus*, Brunn.).—One record only, in 1916.

COMMON SANDPIPER (*Tringa hypoleucos*, L.).—Two records only, both from Connaught Water, May, 1917, and April 27th, 1923.

GREEN SANDPIPER (*Tringa ochropus*, L.).—One record only, December, 1920.

CURLEW (*Numenius a. arquata*, L.).—One record only, September, 1921.

LAPWING (*Vanellus vanellus*, L.).—Occasional flocks seen flying over, but do not often settle in Forest area.

BLACK-HEADED GULL (*Larus r. ridibundus*, L.).—An irregular winter visitor, and by no means common.

LITTLE GREBE (*Podiceps r. ruficollis*, Pall.).—Not common. Occasionally recorded in winter. Nested on Eagle Pond in 1921 and 1923, and Wake Valley pond in 1923.

MOOR-HEN (*Gallinula c. chloropus*, L.).—A common resident.

COOT (*Fulca a. atra*, L.).—A scarce winter visitor. One nesting record, Wake Valley pond, 1923.

STOCK-DOVE (*Columba oenas*, L.).—A scarce Forest bird.

WOOD-PIGEON (*Columba p. palumbus*, L.).—A common resident, with varying increase of numbers in winter.

TURTLE-DOVE (*Streptopelia t. turtur*, L.).—A scarce summer visitor.

PHEASANT (*Phasianus colchicus*, L.).—A straggler to the Forest. May breed occasionally.

PARTRIDGE (*Perdix p. perdix*, L.).—As pheasant.

ARCHAEOLOGICAL INSPECTIONS

St. Giles, Ickenham, Middlesex.—Visited March 24th, 1923.

○ OUR second visit of inspection to this little church proved of great interest.

We noted the importance of the recent restorations which brought to light a roof over the nave, composed of timber construction, now open, owing to the removal of the plaster.

The variety of the window tracery was remarked upon.

Particular attention was paid to the recently discovered mausoleum with vertical coffin recesses. The comparison of the brickwork in this Jacobean portion with that of the adjoining Elizabethan annexe, proved highly interesting.

The whole church is fully described in our record, and the original work done by members in this connection is of value, for the extant descriptions of this interesting building are far from complete or up to date.

St. Michael's, Mickleham, Surrey.—Visited April 21st, 1923.

This church, which we informally visited, consists of much that is new. Rebuilding rather than restoring has evidently been the order of the day, a fact which we had great reason to deplore.

However the Norman tower at the west end, the later Norman chancel arch, and parts of the chancel of the same period, were carefully examined with much interest.

St. Catherine, Mersham, Surrey.—Visited May 5th, 1923.

Hard by the Brighton road, set well upon a knoll, stands the striking church of St. Catherine's.

At our previous visit it was thought that a record should be made at some future time, and this view was found to be fully justified when at our second visit a complete record was taken.

Every part of the church teems with interest, and each is fully noted in our record.

The plan is fully developed with a beautiful Early English tower at the west end. Much of the handsome nave is of the same period, though portions of the earlier Norman period are to be seen. The north chapel dates from the year 1450, and the south chapel is some 50 years later. The south porch is about 1890, and other features, which cannot be referred to here at length, make the church one which should be visited—and our record of it read—by any who do not know the building.

St. John Baptist, Mucking, Essex.—Visited July 21st.

There are some interesting Early English details in this church—lancet windows, purbeck shafts, sedilia and double piscina.

The finely carved Transition cap, alone in its glory, in the nave, is but a fillip to our vain regrets at recent ruthless "restorations."

The mediæval remains, however, were the source of a good deal of profitable discussion, and a very illuminating history of the building was given by the vicar, who led the meeting on this informal but very interesting occasion.

St. Helen, Cliffe-at-Hoo, Kent.—Visited October 18th, 1923.

We again visited this church, but on this occasion our object was to make a record. A large party attended (some members combined Rochester with this visit) and a comprehensive record is now in course of preparation.

It is scarcely possible to speak too highly of this small "cathedral," situated somewhat off the beaten track of Kentish churches, and our record, illustrated with a number of exceptional photographs, shows that all members were greatly interested.

The two chief dates are 1260 and 1350. The former refers to the nave, lower part of the tower, north and south transepts. The latter refers to the chancel and the windows in the aisles.

Some discussion took place as to the Saxon or Norman work on the north side of the north transept, south side of tower, and east side of tower. There is a room over the south porch.

We noted with approval the way in which the ends of the transepts had been restored, correcting a previous "restoration."

St. Bartholomew the Great, Smithfield.—Visited December 8th, 1923.

A large party visited this well known London church, and were conducted round in a very interesting way by one of the officials.

We were first shown the recently commenced restoration work towards the south end of the east side of the cloisters (the few bays of this eastern cloister, towards the north, having been restored some years ago). We were shown how carefully modern brickwork casing was being removed—a difficult work being well done.

We then passed through the "crossing," which is now the west end of the church. We noted the apsidal termination to the "choir"—which is now the main part of the church. The more recent lady chapel was inspected, also the crypt under it. We were all glad to visit once again this fine old bit of Norman London, and were reminded that this is the oldest church remaining in the Metropolis except for the chapel in the Tower.

H. S. STOWELL, *Recorder.*

LIST OF MEMBERS

It is particularly requested that Members will inform the Secretary as soon as possible of any change of address

HONORARY MEMBERS

- Grant, G. F. H., Beaumont Manor, Wormley, Herts. (Arch.)
 Massey, Herbert, M.B.O.U., F.E.S., Ivy Lea, Burnage, Didsbury, Manchester. (Lep., Orn., Ool.)

MEMBERS

- Adkin, R., F.E.S., "Hodeslea," Meads, Eastbourne. (Lep.)
 Aldred, Miss M., Flat 5, 21, Ladbroke Gardens, Notting Hill, W. 11. (Orn.)
 Allingham, D. B., 54, Drakefell Road, New Cross, S.E. 14. (Arch.)
 Aris, A., 1, Ivy Villas, Oldfield Road, Hampton.
 Aris, E. A., 9, Oak Avenue, Priory Road, Hornsey, N. 8. (Lep.)
 Austin, S., 43, Darenth Road, Stamford Hill, N. 16. (Orn., Arch.)
 *Battley, Mrs., 6, Craven Avenue, West Ealing, W. 13.
 Bayne, Charles S., "Hill Rise," Paddockhall Road, Haywards Heath, Sussex. (Orn.)
 Beattie, W., 8, Lower Grosvenor Place, S.W. 1. (Lep.)
 Bell, William H., "Hillcrest," 74, Sylvan Avenue, Wood Green, N. 22. (Lep.)
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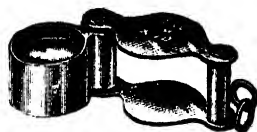
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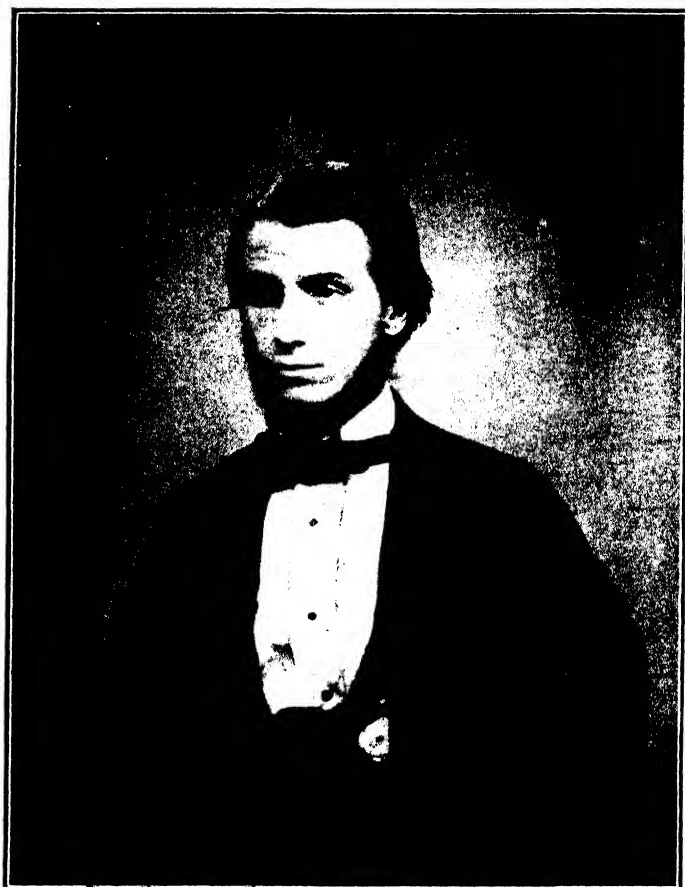
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IN RETROSPECT

By ERNEST ARIS

IT is full sixty years ago since my grandfather, Henry Aris, took down the minutes of the Haggerston Entomological Society. This was the beginning of our Society.

Our address, second floor, The Haggerston Arms, perhaps was not quite so high-sounding as the present-day one, but for all that, our forerunners must have been good entomologists, otherwise we should not exist to-day.

That the environment occasioned difficulties for our first secretary, I believe, for, to quote my grandfather, many of those good entomologists were ardent worshippers at the shrine of Bacchus, and to get them to the higher level required a certain amount of tact; but once there, the good work went on.

In those days entomologists were few. As I write I have before me a copy of "The Entomologist's Annual," 1857, in which is given a list of British entomologists, numbering 322, many of whom were school boys.

Henry Aris, our first secretary, was a good secretary and an ardent worker. Specialising in Micro Lepidoptera, he no doubt contributed something to the general knowledge of this now somewhat neglected order. I quote from "Observations on British Tineina," in "The Entomologist's Annual," 1858:—" *Coleophora therinella*, L.B., p. 217. A thistle feeding larva found this autumn by Mr. Gorham and Mr. Aris, in a long case, somewhat allied to that of *C. troglodytella*, will perhaps produce this insect."

He died April 24th, 1914, being probably the last of forty good entomologists who journeyed down to West Wickham every Sunday morning in quest of the rarities of that day. The rest of my notes are from his conversations with me on entomology.

He told of the sensation caused by the capture of a pair of *Odonotosia carmelita*, at West Wickham, at a time when the British Museum possessed only a hindwing of this then rare insect. How subsequently the ova were sold at one shilling each, and finally the imagines for 30s. each. How the rustic youths of West Wickham learnt the name "Carmelita," and would meet the train conveying the forty good entomologists on those important Sunday mornings, with match boxes containing sorry bodies of *Spilosoma menthrasti*, *S. lubricipeda*, *Xylophasia monoglypha*, and any insect they could catch and offer them, at a price, as "Carmelita," with a delightful disregard to the proper season, and how one, by taking the lot, could have them "for a tanner."

At this then famous rendezvous of West Wickham, the chief object

of interest was the Bishop's fence which surrounded the residence of the Bishop of London. It was a famous fence; so famous indeed that many of those good entomologists would go down on the Saturday night and occupy a bed of bracken, so as to be the first to partake of its treasures in the morning. With my grandfather I once worked this fence, fired by his stories of great rarities, but alas, all I took was a solitary specimen of *Axylotropa areola*. Whether he himself took any great rarity there I forget, but he told of one of the party taking the three forms of the clouded yellow *C. helice*, *edusa*, *hyale*, in a single day. That there must have been exciting times around that old fence I do believe.

Our first secretary also told of 20 foot poles with nets attached to catch the sloe carpet, *Bapta pictaria*, which according to insect lore of those days, flew over the tops of the sloe bushes. Sheets were also taken down to this famous West Wickham for larvae beating, no doubt causing, in those far off days, much wonderment, not to say grave doubts as to our forerunners being "compos mentis."

After the first rush around the Bishop's fence was over, the collectors would disperse each to his own particular ground, to meet again in the evening at "The Jolly Sailor"—probably now in Davy Jones's locker, or at any rate no longer in its rural environment—and over a basin of tea discuss the captures of the day.

Then to the train where, with the vernacular of entomology, they would astonish any fellow traveller, a thing, I fear, they often set out to do.

Another favourite haunt of our first secretary and his good entomologists was Tunbridge Wells. Here it was he captured *Pieris daphidice*. Boxhill, too, was a favourite haunt, being then a locality for *Acidalia ornata*. He told of a sugar adventure, in which after he had sugared the trees, a number of cattle of the horned variety, attracted by the light of his lantern, became frolicsome, whereupon our secretary, on serious business bent, did not enter into the spirit of the fun, and, exercising discretion, fled, leaving his possible captures to the feast prepared.

He told of his capture at Hampstead of *Orrhodia rubiginea* on the ivy blossoms, then considered a great prize.

Apart from the activities of the field, there were "at homes" with Stainton, whom our former secretary often visited at his house at Lewisham. There were field meetings under the leadership of Stainton, and correspondence with the Rev. Harper Crewe, who was then thrashing out the larva problems of family *Eupithecia*.

I quote a passage from "The Entomologists' Annual," 1862, in which he writes as follows:—

"I am now able to add additional description of larvae of British *Eupithecia*, two of which are entirely new to our British *Eupithecia*."

That Stainton may have visited our Society and perhaps given a paper is quite possible, as our secretary was on friendly terms with him and of a pushing and enterprising nature.

LONDON BIRDS

By A. HOLTE MACPHERSON

SUMMARY OF NOTES IN 1922

IN January a party of Chaffinches frequented the lawn near Hyde Park Corner for several weeks.

January 14th, two flocks of Lapwings flew across Kensington Gardens in a north-westerly direction, at a considerable height.

Towards the end of this month several Herring Gulls were to be seen on the Serpentine, and sometimes on the Round Pond.

February 3rd, a Mistle Thrush sang in Kensington Gardens on this and various subsequent dates.

February 11th, saw a Redwing in Kensington Gardens, and also a Lesser Spotted Woodpecker. Among the Black-headed Gulls on the Serpentine was one uniformly dark bird, no doubt a victim of the oil nuisance, but it seemed quite free in its movements.

February 13th, saw a Great Crested Grebe on the Serpentine, and met C. A. Cresswell, who told me that he and his brother had seen an adult male Red-breasted Merganser there on the previous day. [This occurrence is recorded in "The Field" of February 25th, 1922. I believe it is the only record of the species in Hyde Park.]

February 15th, watched a male Lesser Spotted Woodpecker "drumming" in Kensington Gardens.

A few Jackdaws cling to their old haunts in the south-west corner of Kensington Gardens; watched one or two of them on February 18th, near Kensington Palace.

February 20th, heard Chaffinch in full song near Hyde Park Corner.

The weather towards the end of March became cold, and on April 5th, a date by which most of the Black-headed Gulls have usually left town, about 20 of them were standing on the ice of the frozen Long Water.

April 14th, my wife heard a Cuckoo on Campden Hill.

Most of the Tufted Duck and all the Pochards which had frequented the Serpentine during the winter had left by April 21st, and all the Black-headed Gulls had disappeared, except one immature bird which remained by the island in the Serpentine throughout the summer.

April 23rd, at Ranelagh, heard Chiffchaff and Willow Wren, and saw some Swallows.

April 24th, a Swallow flying over the Serpentine.

April 26th, a Great Crested Grebe appeared on the Serpentine and stayed there for two days. Several Willow Wrens now in Hyde Park and Kensington Gardens.

May 8th, in the grounds of Holland House, heard Blackcap and Willow Wren in song.

May 9th, a Willow Wren was singing in Kensington Gardens.

May 10th, a Garden Warbler singing in Kensington Gardens, near the Serpentine Bridge. Swifts and Swallows were on this day flying over the Serpentine. A few Swifts were to be seen there throughout the summer up to August 1st.

May 11th, saw three Spotted Flycatchers and a Common White-throat in Kensington Gardens.

May 24th, before breakfast, listened to Lesser Whitethroat singing in the grounds of Holland House.

June 14th, at 9.40 p.m., a cold and stormy night, a Cuckoo perched on one of the trees in Campden Hill Square, opposite my house, and called four or five times and then flew away. We heard the call repeated a short distance away.

June 17th, visited the grounds of Holland House, where the Lesser Whitethroat and Chiffchaff were singing. On meeting the head gardener he took me to a nest of the Great Spotted Woodpecker, in the trunk of a cherry tree, about five feet from the ground. It apparently contained two young birds, one of which kept looking out of the hole and calling vigorously, and was nearly ready to fly. A week later the nest was empty. (I had known for some years that the Great Spotted Woodpecker frequented the grounds of Holland House, but had never before seen its nest. It was a fairly common species in Kensington Gardens when Yarrell wrote his "History of British Birds.")

June 28th, heard a Blackcap singing beautifully near the Band Stand in Hyde Park. It remained for several days in this neighbourhood, and could frequently be heard during the first week of July.

June 30th, a Lesser Whitethroat in song by the Bridge over the Serpentine. (I have seen it stated that this species nested in Hyde Park this summer, but have been able to get no evidence of it.)

July 21st, a Blackcap singing on the east side of the Long Water in Kensington Gardens; rather late.

August 2nd, a few Tufted Duck have now returned to the Serpentine.

By August 16th several Black-headed Gulls had reappeared.

Throughout this month the weak autumn song of Willow Wrens could be heard almost daily. These are clearly immigrants to London.

September 26th, a Chiffchaff was singing feebly in my back garden; it stayed there for two days.

October 3rd, saw a Heron fly over Kensington Gardens.

October 12th, saw a Magpie, chased by Black-headed Gulls, fly to the island in the Serpentine.

October 27th and November 8th, a Grey Wagtail was by the Serpentine on each of these days.

November 29th, a Kestrel hovering near the Round Pond.

December 4th and 5th, a Mistle Thrush was singing well near the Ranger's Lodge, in Hyde Park, and on the latter date I saw a Kestrel in Hyde Park.

December 5th, saw on the Serpentine a female Tufted Duck with a clear white face. Young males and old female Tufted Ducks sometimes have a few white feathers above the bill; but I had never seen a bird like this, which had quite as much white on its face as a female Scaup. I only saw it on this occasion.

The drake Gadwall, about which letters were written to the newspapers last year, began to spend its third winter on the Round Pond. But the pond was drained and cleaned, so the bird migrated to the Serpentine.

Mr. C. A. Cresswell told me that on Boxing Day he watched a Kingfisher in the Dell at the east end of the Serpentine.

SUMMARY OF NOTES IN 1923

January 30th, Chaffinch singing in Hyde Park.

January 31st, a pair of Egyptian Geese have taken to frequenting an elm tree in Kensington Gardens. They walk about the bigger branches, about 20 feet from the ground, like Peacocks. To-day there were 69 Tufted Duck on the Serpentine.

February 4th, Mistle Thrush singing with great richness and strength in the garden of Holland House. Also heard a Greenfinch singing there; rather an early date.

February 10th, saw a Black-headed Gull in complete spring plumage.

February 18th, Blackbird singing well on Campden Hill.

March 1st, the drake Gadwall, which left the Round Pond when it was drained at the end of 1922, has been at the east end of the Serpentine ever since. To-day I saw it pairing with a Wild Duck. The preliminary overtures were made by the lady.

March 25th, watched a Great Spotted Woodpecker in the grounds of Holland House.

April 5th, Yellow Wagtail at Barnes, the first I have seen this year. There are only a few immature Black-headed Gulls and one or two Tufted Ducks on the Serpentine.

April 11th, a Willow Wren singing in Kensington Gardens.

April 13th, before breakfast, I heard two more Willow Wrens singing and a Great Spotted Woodpecker drumming in the grounds of Holland House.

April 18th, a Reed Warbler in song by the Long Water in Kensington Gardens. Saw a Black-headed Gull with complete dark head, but with brown on wing coverts and dark top to tail, like the lower figure in "Yarrell."

April 20th, Sedge Warbler singing on the island in the Serpentine.

[April 24th, a Holly Blue butterfly in my garden in Campden Hill Square.]

April 26th, two or three House Martins over the Serpentine. Only three Tufted Duck now there.

May 8rd, heard a Cuckoo calling in the grounds of Holland House.

May 4th, looked at a Crow's nest in a plane tree in Eccleston Square, near Victoria Station. Listened in the evening to a Blackcap singing and to a Great Spotted Woodpecker drumming in Holland House Grounds.

May 8th, two Swifts in Kensington Gardens. Spotted Flycatchers have also arrived; saw two in Hyde Park near the Police Station.

May 9th, at least a dozen Swifts over the Serpentine.

May 12th, a Garden Warbler singing near the Peter Pan Statue in Kensington Gardens, and a pair of Spotted Flycatchers not far away.

June 2nd, saw some fully fledged Yellow Wagtails being fed by their parents at Barnes.

June 8rd, was shown a Great Spotted Woodpecker's nest in the grounds of Chiswick House. It was about six feet from the ground, in the trunk of a yew tree. The hen bird flew off the nest. She was apparently sitting. There are some new holes, but, as far as I can ascertain, no occupied nest in the grounds of Holland House this year.

June 30th, two or three Swifts have been flying round this square for about a week.

July 23rd, some Swifts still flying about this Square, but I cannot get any evidence of their nesting in the neighbourhood. Some have been over the Serpentine ever since their arrival in May. A Blackcap still in song in the grounds of Holland House.

August 12th. [A small Copper butterfly, the only one I have ever seen alive in London, settled on some yellow Heleniums in my garden.] Watched some young Spotted Flycatchers in the garden of Holland House; have no doubt they were bred there.

August 16th, saw a Common Whitethroat in my garden.

August 22nd, have heard Willow Wren's autumn song most days this month. Many Sand Martins to-day over Serpentine.

August 25th, saw two Swifts over the Serpentine, the last of the year in London. Had not seen them regularly since August 10th.

September 24th, four House Martins in Kensington Gardens.

September 25th, a Swallow flew over Campden Hill Square.

October 25th and 26th, saw a Grey Wagtail by the Serpentine.

November 8th, two Scaup (females or young) on the Round Pond; also saw there the male Gadwall—its fourth autumn appearance.

November 15th, a Magpie flew across the Serpentine to the island this morning.

November 16th, saw two Black-headed Gulls perched on a tree on the island. This is a rare sight; yet Bonaparte's Gull nests in trees habitually.

November 19th, several Common Gulls on the Serpentine.

November 20th, a Herring Gull and a Dabchick on the Serpentine.

December 1st, saw two Goldfinches at Barnes. A Lapwing flew over Hyde Park.

December 8rd, a Fieldfare in Park's Field, by Kensington Palace Gardens.

December 5th, Grey Wagtail by the Serpentine.

December 6th, saw five Redwings in Kensington Gardens.

December 8th, heard Thrush singing. Generally they begin to sing in November, but this year that month was about the coldest (though also the sunniest) November ever known.

December 10th, a Fieldfare in Kensington Gardens.

December 28th, saw a pure white Blackbird with black primaries in Hyde Park. It had a yellow bill and pale pink legs. Its eyes appeared to be normal. An extremely handsome bird.

SUMMARY OF NOTES IN 1924

January 11th, a few Redwings on lawn at Hyde Park Corner.

January 15th, heard a Blackbird singing weakly. Saw one or two Redwings in Hyde Park.

January 25th, at least 100 Tufted Duck and 25 Pochard on the Serpentine. Why are three-quarters of the former and all but six of the latter adult males?

February 7th, saw a Wren in Kensington Gardens.

February 8th, one Black-headed Gull on Serpentine in full spring plumage.

February 14th, saw a Scaup (female or young) on the Serpentine, also 23 Coot. A pair of Woodpigeons were at work on a nest near Hyde Park Corner.

February 15th, no signs of the Scaup to-day; but a great crowd of over 100 Tufted Duck close to the island, which is the only portion of the Serpentine not covered with ice. Thermometer 24° F. at 8 a.m.

February 17th, several Common Gulls on the frozen Round Pond; they are too shy to take the food thrown to the Black-headed Gulls.

February 18th, saw a Redwing in Hyde Park.

March 3rd, snow lying. Two Redwings in Kensington Gardens. Saw the drake Gadwall pair with a Wild Duck, and as was the case last year, the preliminary advances were made by the latter.

March 8th, watched a party of Redwings in the grounds of Holland House.

March 11th, more Redwings in Kensington Gardens.

March 13th, several Common Gulls standing on the frozen Long Water. Saw a Woodpigeon sitting on nest in Kensington Gardens.

March 14th, at dusk I walked along the north bank of the Serpentine. Many Woodpigeons arrived to roost in the trees on the island; counted over 400 of them.

March 16th, my wife saw a Jay in the grounds of Holland House. The head gardener told me a few weeks ago that a flock of fifteen Jays arrived there one day in the autumn, and that two had remained.

March 19th, two Redwings in Kensington Gardens.

March 27th, saw a Kestrel flying over Campden Hill.

March 28th, watched a Great Spotted Woodpecker in Kensington Gardens.

April 2nd, three Redwings in Kensington Gardens. Wind has

been east or north-east almost without intermission for several weeks. It might be mid-winter from the appearance of the trees.

April 8th, saw a Moorhen and a Woodpigeon, both sitting on nests in Kensington Gardens.

April 16th, saw a Redwing in Kensington Gardens—a late stayer.

April 17th, Willow Wren has arrived in Kensington Gardens.

April 23rd, saw half a dozen Yellow Wagtails at Barnes.

April 25th, a Swallow flying over the Long Water, and watched the male Gadwall with a Wild Duck, paddling about aimlessly. No signs of their nesting.

April 29th, Swifts are here; saw half a dozen of them over the Round Pond; also saw and heard a Common Whitethroat singing in Kensington Gardens.

April 30th, more Willow Wrens arrive. Heard one on Campden Hill, and on May 1st several in Kensington Gardens and Hyde Park.

May 7th, noticed a Wheatear on a chair in the open space to the east of the Long Water.

May 9th, Common Whitethroat singing in Kensington Gardens.

May 13th, many Swifts have arrived; about thirty over the Round Pond and more over the Serpentine. Saw one Sand Martin over the Long Water, and heard a Lesser Whitethroat singing in Kensington Gardens near the Bridge.

May 14th, two Common Whitethroats in the Sanctuary in Kensington Gardens; also saw several Spotted Flycatchers and one Willow Wren near the Police Station in Hyde Park.

May 15th, a pair of Swifts have flown about this Square for the last three days. Saw a pair of Spotted Flycatchers in Kensington Gardens. Heard a Cuckoo to-day in the grounds of Holland House. A pair of Tufted Ducks are still to be seen by the island in the Serpentine.

May 16th, a Common Whitethroat singing in the Kensington Gardens Sanctuary, and a Lesser Whitethroat on the island. One Black-headed Gull remains on the Serpentine: an adult in full spring dress. Great Spotted Woodpecker "drumming" at Holland House.

May 17th, heard a Garden Warbler singing beautifully in Lady Holland's Walk.

May 20th, a Sedge Warbler in song at the north end of the Long Water. Saw and heard this bird on most days, and always at this spot, until June 6th, when I left town for a few days. After my return I did not come across it again; but Mr. Rudge Harding thinks he heard the same bird on June 10th in Hyde Park Sanctuary.

May 22nd, a Garden Warbler singing by the Peter Pan Statue in Kensington Gardens.

May 24th, heard Garden Warbler again at the same place.

May 28th, a Lesser Whitethroat singing near the Police Station, and a Garden Warbler singing in the Hyde Park Sanctuary. I heard this latter bird on various subsequent occasions up to June 24th.

June 6th, a family of Blue Tits in one of my nesting boxes in my garden are nearly ready to fly.

July 15th, in the grounds of Holland House, before breakfast, heard both Blackcap and Garden Warbler in song.

July 22nd, saw female Tufted Duck on raft by island in Serpentine, with two small ducklings. [Mr. Harold Russell tells me he saw the bird on the raft with six newly hatched ducklings on July 15th.]

August 5th, Swifts have been seen all the summer over the Serpentine. A dozen of them were circling high over this house at 7 p.m. this evening.

August 7th, Willow Wren's autumn song in Campden Hill Square.

August 25th, two Swifts at Barnes: the last I saw in London.

September 30th, Chiffchaff singing in the Kensington Gardens Sanctuary.

October 4th, heard a Chiffchaff singing in the acacia tree in my garden.

October 17th, a Meadow Pipit flew across the Serpentine.

October 23rd, the male Gadwall is on the Round Pond—his fifth autumn there.

October 30th, saw a Great Spotted Woodpecker tapping on elm tree in Kensington Gardens.

November 10th, a Thrush singing strongly at Barnes.

November 22nd, there are a dozen Pochards, and double that number of Tufted Duck now on the Serpentine, and a good many Black-headed Gulls have arrived for the winter.

November 25th, saw a Kingfisher by the east side of the Long Water.

December 8th, a Kingfisher flew down the Thames at Barnes.

December 18th, Gray Wagtail by the Serpentine this morning, and a Mistle Thrush was singing near Hyde Park Corner.

December 19th, there are now about forty Tufted Duck and a dozen Pochard on the Serpentine.

[N.B.—Prior to July, 1924, I had never seen Tufted ducklings on the Serpentine, but Mr. C. A. Cresswell tells me that one summer before the war he saw a Tufted Duck with a family of eight or nine in down, crossing the path at the east end of the Serpentine. The mother bird evidently wanted to take them to the Dell, but their progress was barred by the wire netting fixed to the railings.]

ARCHAEOLOGICAL INSPECTIONS

St. Olave, Tooley Street, and Guy's Hospital.—Visited February 16th, 1924.

THE afternoon was spent in the Boro' of Southwark. After visiting the older parts of Guy's Hospital, with its interesting Court Room, we inspected the Chapter House of Southwark Cathedral, which was formerly Parish Church of St. Thomas, and subsequently the chapel of St. Thomas's Hospital. We then passed on to the closed Church of St. Olave, Tooley Street.

Thence we glanced in at the cathedral, gave passing notice to an old Dutch reconstructed shop front (1663), and ended our interesting tour at the old coaching hostelry, the George Inn, with its courtyard façade dating from 1676.

We must say one word of regretful farewell to St. Olave's, for this church, except for Fliteroff's tower, is condemned to demolition. Its architect, who lived in Renaissance times (between Wren and Robert Adam), was also responsible for St. Giles' in the Fields. When part of the earlier Gothic church (first mentioned in 1281) was found to be in a state of collapse about 1738, the present church was built. At the west end there is a vestibule, the width of the church with the tower over in the north-west corner. The nave consists of five bays divided by fluted ionic columns, supporting an entablature, attic, brackets, cornice, and finally a semi-circular vaulted ceiling, with an intersecting vault to each bay. There are side aisles with galleries over, and an apsidal chancel. The Rev. T. P. Stevens acted as guide on this occasion, and gave an interesting account of the history of the church; an article by him, published in the "Southwark Diocesan Gazette" for January, 1924, has been placed in the library.

Lambeth Palace.—Visited March 8th, 1924.

A large party much enjoyed a tour of this noble pile of buildings, the London home for seven centuries of the Archbishops of Canterbury.

The familiar red brick gate-house dates from Cardinal Morton's time (1490). The Great Hall (Archbishop Juxon, 1663), with its fascinating arched hammer beam roof, now houses a wonderful library. The oldest portion of the palace is the early 13th century crypt, beneath the chapel. This chapel itself is late 13th century. The whole range of buildings is intensely interesting.

All Saints, Ockham, Surrey.—Visited March 15th, 1924.

Much discussion arose from our inspection of this charming Surrey church, as the record in our library will show. Apart from the uncommon type of seven light east window, with its beautifully moulded and carved shafts and arches, interest was centred on the modern method of restoration carried out with red tiles in such a manner that all new work was obviously new, and therefore no question could arise as to which portion was mediaeval and which were modern. We noticed, however, that some of the 14th century tracery on the south side required immediate attention.

Our thanks are due to Mr. Parry for valuable help in elucidating numerous points which arose, and for photographs, etc.

Porchester, Hants., Castle and Church.—Visited May 2nd-5th, 1924.

The success of our visit to this old castle—itself a revelation to some of our keenest archaeologists—was almost entirely due to the spade work of Dr. Simpson, who, by his mastery of the castle's history, together with his meticulous preparation of plans, enabled us to listen at ease to a tale of intense interest, and see for ourselves the facts and look for and discuss his theories.

Dr. Simpson has passed on a record for circulation, and this is no place to quote even a tithe of the information contained in this valuable contribution to archaeological research.

St. Thomas, Navestock, Essex.—Visited June 14th, 1924.

A record of our inspection will appear in due course on the shelves of our library. There is here a small church, with nave, chancel, aisle, and a curious tower. A few remains of the Norman period are suggested on the north side. Work of the successive centuries is to be found. Much of the arcading is formed not of stone but of adzed oak. As the timber work is whitened to imitate stone, we felt a loss of interest.

Sts. Peter and Paul, Shoreham, Kent.—Visited July 12th, 1924.

An unrecorded inspection was made.

Although the whole building is of general interest, the chief feature is the rood loft across the nave-chancel opening, supported by a beautiful chancel screen, extending across the aisle as well as the nave. This is a wonderful piece of work, fortunately spared to us when practically all others (the rood loft was at one time universal) were removed by order.

The Church of the Holy Cross, Sarratt.—Visited September 6th, 1924.

This late Norman cruciform church proved of no little interest. The record will deal with its history from those early times to the present day, for each century is represented by work of note.

London Museum, Lancaster House, St. James's.—Visited November 15th, 1924.

This visit provided an instructive afternoon. Sir Chas. Barry, the author of the Houses of Parliament, was responsible for the grand staircase and the interior decoration, and thus altered Benjamin Wyatt's original design of 1825.

Under the guidance of Mr. Chapman we inspected a large portion of the exhibits which tell of the history, the social life and the customs of London, from Roman times to the present day.

H. SPENCER STOWELL, *Recorder*.

HEPATICS FOUND IN EPPING FOREST

By J. ROSS

MOST of the hepatics in this list are common, the exception being *Ptilidium pulcherrimum*, which has usually been considered a species of the north and west, but has now been found at three stations in Epping Forest. The list is admittedly incomplete, and more careful searching will add to it.

Riccia fluitans, L.
Lunularia cruciata (L.), Dum.
Marchantia polymorpha, L.
Metzgeria furcata (L.), Dum.
Pellia epiphylla (L.), Corda.
Pellia Fabroniana, Raddi.
Fossombronia pusilla (L.), Dum.
Alicularia scalaris (Schrad.), Corda
Aplozia crenulata (Sm.), Dum.
Gymnocolea inflata (Huds.), Dum.
Lophozia ventricosa (Dicks.), Dum.
Lophocolea bidentata (L.), Dum.
Lophocolea cuspidata, Limpr.
Lophocolea heterophylla (Schrad.),
 Dum.

Chiloscyphus polyanthus (L.), Corda.
Cephalozia bicuspidata (L.), Dum.
Cephaloziella byssacea (Roth.),
 Warnst.
Calypogeia Trichomanis (L.), Corda.
Calypogeia fissa (L.), Raddi.
Lepidozia reptans (L.), Dum.
Ptilidium pulcherrimum (Web.),
 Hampe.
Diplophyllum albicans (L.), Dum.
Scapania nemorosa (L.), Dum.
Scapania irrigua (Nees.), Dum.
Madotheca platyphylla (L.), Dum.

Madotheca platyphylla occurred on hornbeam some years ago, but has been replaced by *Metzgeria furcata*.

NOTES ON VIOLA ODORATA, L., VAR. IMBERBIS, LEIGHT.

By E. B. BISHOP

THIS particular variety, distinguished by the absence of the usual tuft of hairs from lateral petals, occurs—taken in an aggregate sense—sporadically in the Godalming district.

I have observed it with white petals (*dumetorum*, Rouy et Foucaud), flesh-coloured (*subcarnea*, Jord.), and “violet” (*i.e.*, type colour of species). Leighton’s type of his variety is white-flowered, and, although many observers have drawn attention to its occurrence with other colours, most of them seem to imply that white predominates.

My experience in this district, based, I must admit, upon haphazard observation rather than upon systematic work, is quite the opposite. Violet-flowered plants of *imberbis* seem to be in overwhelming preponderance, flesh-coloured and white occurring but occasionally. My chief station for *imberbis* is about a quarter-mile of copsy hedgerow, bordering a path leading down from the crest of the chalk. Here it grows in the greatest profusion, entirely violet-flowered, and, although I have examined many dozens of plants, I have not found one of type *odorata*.

All the colour forms are very fragrant, the flesh-coloured especially so. I cannot recollect any of the *subcarnea* flowers which on various occasions I have examined, in gardens, on churchyard graves, and elsewhere, not only around Godalming but all over the country, being other than of *imberbis* form.

This has brought me, very reluctantly, to the conclusion that *subcarnea* is usually, if not always, a garden escape. And I have grave doubts, which I would fain have dispelled, as to *imberbis*, Leight., being truly native.

It may not be out of place to mention the parallel variation in a related species. Although I have examined many plants of *V. hirta*, L., with a like purpose, on only one occasion have I met with its *f. imberbis*, Gregory. The first specimen was brought to my notice by Mr. H. J. Burkill, on April 30th, 1924, at Wimbish, Essex. Further search revealed to us about a dozen plants. Obviously these were truly wild.

The only locality given for this *forma* by Mrs. Gregory, in her “British Violets,” is Felsted, about eleven miles from Wimbish, in the same county.

THE VIOLETS OF LIMPSFIELD COMMON

By R. W. ROBBINS

○ N this somewhat elevated area of heathy common, crowning the ridge of the Lower Greensand, typical *Viola Riviniana*, Reichb., and *Viola canina*, Linn., are both to be found, the former occurring plentifully on hedgebanks bounding the Common, and in shady or half-shady situations around the furze and other tall growth. *V. canina* is much more restricted, and is chiefly confined to one small area of close turf and heather, though occasionally seen elsewhere in open situations.

The evident points of difference of the two types can be well seen, and may perhaps be summarised as follows:—

V. Riviniana.

Habit.—Leafy, with a flowerless rosette of foliage from which flowering branches arise in spring.

Leaves.—Thin in texture, usually as broad as long, pointed, with cordate base and borne on long slender petioles.

Flowers.—Large, squarish in outline, slaty or purple-blue, stout cream or leaden coloured spur, and conspicuous square calyx appendages.

V. canina.

No rosette. Perennial stems irregularly branched bearing flowers and leaves.

Somewhat thick, often twice as long as broad, scarcely cordate, blunt, and with shorter stouter petioles.

Smaller, roundish in outline, clear blue with large white eye, bright yellow rather slender spur, and rounder smaller calyx appendages.

Although these two types are to be seen there, the form of violet which is by far the most plentiful and conspicuous in open places on the Common, in May, cannot readily be assigned to either. It is, however, a well marked race. The following note was made on May 28th, 1924:—

“The violet is in great profusion. Patches with hundreds of flowers. They have small bright blue flowers with a violet shade, a white eye not conspicuously large, and bright yellow slender spur. The leaves are dull dark green, small, broader and not so long as *V. canina*, with longer leafstalks, several times as long as the blade as a rule, somewhat pointed, but not sharply so. *Viola canina* flowers are rather clearer bright blue, with large white eye, equally small and generally

rounder in outline and petal. They (*V. canina*) are not nearly so floriferous."

The bright yellow spurs of the Limpsfield violet at once attract attention. They are often upturned and so the more noticeable. This race is not identical with *V. canina*, Linn., var. *ericetorum*, Reichb. (*V. flavicornis*, Sm.), which has small leaves on long petioles, but of the *canina* type, and true *canina* flowers. The Limpsfield plant has its foliage of the *Riviniana* type and often, but not always, an evident barren rosette. The flowers are more like *Riviniana* in shape. When young they have conspicuous squarish calycine appendages, but these do not afterwards increase in size. They bear apparently fertile seed from the spring flowers, and capsules have also been found in the autumn.

Mr. E. B. Bishop has seen this plant and suggests that it may be *V. Riviniana* var. *diversa*, Gregory. That it has some points of resemblance to Mrs. Gregory's var. *diversa* is evident, but the essential character of that variety is that it flowers in *early spring* with numerous small flowers, varying in colour from lilac to reddish purple, while *later* the flowers, still of various colours, are "much larger." The Limpsfield violet has no small early-flowering stage. It is late coming into bloom, later than typical *Riviniana*, and varies little in its bright violet-blue, yellow spurred flowers.

Although Mrs. Gregory states in her "British Violets," p. 67, that in her experience hybrids of *V. canina* \times *V. Riviniana* are quite sterile, it is difficult to resist the conviction that in this Limpsfield race we have a hybrid, which I should consider as *V. canina* \times *V. Riviniana*, of long standing, and with sufficient fertility to become the predominant form in its area, to the extent that it has almost ousted the parent *V. canina*, with which it competes in the open ground.

PAPERS READ TO THE SOCIETY

January 1st.—“The Land’s End,” by J. E. S. Dallas.

February 5th.—Annual Exhibition. Also Slides of British Birds, Butterflies and Moths, by C. W. Colthrup. “The Inca Observatory in Peru,” by M. G. Palmer. “Geological Resemblances of the London Basin and the Isle of Wight,” by C. O. Harvey. “Orchids Found Near London,” by J. E. S. Dallas.

February 19th.—“Evolution and Cuckoo’s Eggs,” by E. C. Stuart Baker.

March 4th.—“Old Buildings in Italy,” by E. Chapman.

March 18th.—“Instinct and Reason,” by Dr. M. Culpin.

April 15th.—Bacot Memorial Evening. “The Zygaenidae,” by T. H. L. Grosvenor.

May 6th.—“The Flora of Limpsfield,” by R. W. Robbins.

May 20th.—“Tournai Cathedral,” by W. C. Forster.

September 16th.—“A Recent Visit to Vesuvius and Pompeii,” by E. W. Harvey Piper.

October 7th.—“The Value of Menageries and their Abuse,” by E. Capleton.

October 21st.—“Pond Life,” by E. C. Ash.

November 4th.—“Evolution and Cuckoo’s Eggs” (part 2), by E. C. Stuart Baker.

December 2nd.—“The Presidential Address,” by E. B. Bishop.

December 16th.—“The Woodland,” by J. Ross.

MARKET CROSSES

By H. SPENCER STOWELL, M.S.A.

UNDoubtedly most villages and towns either possess, or did possess in times past, a market cross, and the question as to its use may often have been asked, as was the case at one of our recent meetings, yet the query has never been adequately answered; neither has the subject received the attention it deserves.

True, Mr. Aymer Vallance and other writers have much valuable and interesting matter in their books on the more general subject of old crosses, but I feel strongly that there is here an opportunity for the society to do some original work.

There are markets and there are crosses as separate structures, but we are now to consider the combined structure. This may be either a name combination due to the position of the structure, or a combination of usage. Under the former type come the markets found at cross roads.

From the earliest times men wishing to buy and sell would go to the place in the village or town, where they would be most likely to meet the maximum number of strangers wishing to sell or buy. No hole in the corner would do. It must be, for example, at the cross roads, where one could see and be seen. The cross roads, where a by-road connected with the main road, would soon become a place of marketing. First, individuals would provide shelter here, and later the community would erect a permanent building, and the result would be a building at the cross roads, sheltering the marketing public.

Now consider the usage combination—a village cross around which marketing takes place. Both market and cross (if the latter has any meaning at all) would naturally be in a suitable position. If the position is suitable for a cross, it would likewise be suitable for the purpose of a market. The cross would be there long before the market, and the market would naturally establish itself there because of the custom of the people in gathering around the cross.

I will say this, that if the building such as is found in the City of Chichester, for example, is a market cross, then we have as a definition a building at cross roads to shelter a market. And if the cross at the little village of Corfe Castle is a market cross, we have another definition, a cross within a place now also used as, or suitable for, a market.

In the former case the definition is based upon position in relation to cross roads and use as a market, and is not due to its own shape, whilst in the latter the name is given to a cross (because of its sacredly symbolic shape) about or near which a market is held.

It is necessary to consider a variety of structure types, as well as a variety of uses.

We can all recall the modern market; let us consider two ancient ones. We are told that there is at Jerusalem, by the sheep market, a pool which is called Bethesda, having within its five porches many lame and halt awaiting cures. We have here a sheep market, a structure with five arches about the year 82 A.D., sufficiently commodious to shelter many casualty cases, one of whom at least was told to take up his bed and walk.

Another reference from the same source. According to St. Matthew in a parable (always a true reflection of conditions), the labourers who were each paid one penny at whatever hour they were engaged, were all taken from the market. This was the labour exchange of days gone by.

Further as to use, according to Bishop Milner, the general intent was twofold, religious and ethical, first to incite public homage to the religion of Christ crucified, and secondly to inspire men with a sense of morality and piety amidst the ordinary transactions of life. Mr. Forster put it to me in this way—"If a transaction took place within view of a cross it was bound to be an honest one."

According to Braid, every town had its cross, at which engagements, whether of a religious nature or of a worldly interest, were fixed. An elaborate market cross existed in Abingdon, of the Eleanor Cross type, around which some 2,000 persons assembled to sing a psalm of thanksgiving at the signing of the treaty with the Scots in 1641.

The Butter Cross at Winchester, which has a suggestion more of piety than commerce, and dates from the second half of the 15th century, stands on the pavement alongside the High Street, at a point where a narrow lane leads to the north-west angle of the Cathedral Churchyard.

Each town has its own speciality in commerce. The cross in Salisbury is known as the Poultry Cross; that at Dunster, Somerset, is a yarn market cross. There are butter crosses at Oakham, Winchester, Barnard Castle, and Bungay, Suffolk. That at Nottingham is a malt cross, and at Maidstone there is a corn cross. Other crosses are for general marketing purposes.

As to types of structure, apart from the purely Chichester type (in contrast with the Corfe Castle type), there is the combined type such as at Cheddar, where a single cross on steps has had a building put around it, the head of the original cross appearing through the later roof. It may be here mentioned that many old crosses remain unaltered by the addition of a protecting roof, known, not as market crosses, but as preaching crosses, churchyard, roadside, village, or Eleanor crosses; and there is the modern memorial of a shaft on steps.

Bishop's Stortford *had* six crosses, but only one was a market cross, the others, except for a churchyard cross, were wayside crosses, one in each of the four roads leading to the centre of the town.

Treating our subject chronologically, it may be said that the earlier the type the more cross-like the form, and that later the usefulness of

the building as a market became predominant, whilst as the 17th century advanced, even the cross at the summit was, in some cases, abandoned altogether. Of the 18th century there are rectangular crosses at Woodstock and Wakefield. Of the same period, those at Bungay and Swaffham suggest "band stands" except for the surmounting figure of Justice.

First of all then we have the early market cross, little different from the simple churchyard cross, but as business increased a building was necessary, and as a last development, as time went on, the greater increase of business necessitated the pulling down of such excrescences as buttresses, and the result was a businesslike building losing its early significance of the cross.

Many have disappeared, but the history of some of them is known. In order to show the kind of treatment which some received I will instance Norwich. The first one was erected in the reign of Edward III., and it was repaired in the reign of Henry IV. Since it contained a chapel and four shops, its size must have been considerable. It was pulled down in 1501 and rebuilt, and this second one also contained an oratory or chapel. It was octagonal, raised on steps (there was an upper storey), and its finish was spire shaped. In the 17th century it was given a different appearance by being surrounded by sixteen pillars supporting a flat leaded roof to shelter the marketers. Then, in the reign of Edward VI., the crucifixes were removed. The standard weights and measures of the city were kept here. In 1547 the oratory was let to a company of workers in leather. In 1646 it was repaired by means of a graduated tax, and the floor was paved. In 1664 it was appointed for the Court of Guard.

The year 1672 saw it beautified and adorned according to the fashion of the day! Sixty years later it was all swept away.

THE BIRDS OF WALTHAMSTOW RESERVOIRS

**A Summary of Observations made from October,
1919, to December, 1924**

By R. W. PETHEN

These notes are based on a paper entitled "Bird-Life in North-East London," read before the Ornithological Section of the Society, on Tuesday, April 10th, 1923, with additional records to the end of December, 1924.

THE Walthamstow Reservoirs are situated on the north-eastern boundary of the County of London. From Upper Clapton they are approached via Springhill and Coppermill Lane, all but one of them being on the left of the last-named thoroughfare.

The one on the right, the "Racecourse" reservoir, contains four islands and is 59 acres in extent, while that on the immediate left is known as "No 5," and has two islands and an area of about 41 acres.

There are several other reservoirs on the left of the Lane, but with few exceptions, my observations on the birds are confined to those seen or heard on either the "Racecourse" or "No 5."

I walked through Coppermill Lane for the first time in October, 1919, and one of the birds observed on that occasion was a Great Crested Grebe, a fact that struck me as being very remarkable, considering that this spot is just on the 6 mile radius from Charing Cross.

Since then I have met with 73 species of birds there. But this does not exhaust the list by any means, for I have from time to time seen other species but been unable to identify them with certainty, owing to bad light and other causes, and practically all my observations have been made from the public thoroughfare.

A division of the 73 species into categories according to their movements, shows that 29 are resident, 11 summer visitors, 10 winter visitors, 12 passage migrants, and 11 unplaced. Of those unplaced, five are included on the strength of one occurrence.

CARRION-CROW (*Corvus c. corone*, L.).—Increasing resident. The most interesting trait of this species, as observed at these reservoirs, is its habit of assembling in parties at dusk. I first observed one of these parties numbering 22 on August 11th, 1921. I have since observed similar gatherings in every month of the year except March, the numbers in these flocks varying from 12 to 68.

HOODED CROW (*Corvus c. cornix*, L.).—One seen on October 30th, 1921, on an island on "No 5."

STARLING (*Sturnus v. vulgaris*, L.).—Common resident. In some years, the trees on the islands are used as roosting places by large flocks in the autumn and winter.

GREENFINCH (*Chloris c. chloris*, L.).—Resident, but only a few birds to be met with in the nesting season.

BRITISH GOLDFINCH (*Carduelis carduelis britannica*, Hart.).—Scarce winter visitor. One seen on January 6th, and another December 14th, 1924.

HOUSE-SPARROW (*Passer d. domesticus*, L.).—Common resident.

TREE-SPARROW (*Passer m. montanus*, L.).—Rare passage migrant. 5 seen October 15th, 1924.

CHAFFINCH (*Fringilla c. coelebs*, L.).—Common resident.

LINNET (*Acanthis c. cannabina*, L.).—Uncommon visitor. 4 seen April 30th, and 1 on May 9th, 1922. 1 on April 13th, 1924.

LESSER REDPOLL (*Acanthis linaria cabaret*, P.L.S. Mull.).—Uncommon visitor. 1 seen November 5th, 1921, and 1 on May 9th, 1922.

REED-BUNTING (*Emberiza s. schoeniclus*, L.).—Fairly common resident. One singing on February 2nd, 1923.

SKY-LARK (*Aldaia a. arvensis*, L.).—Resident; have heard its song in every month excepting November and December.

PIED WAGTAIL (*Motacilla a. yarrellii*, Gould).—Not very numerous during the nesting season. The bed of reeds between "No 5" and the Lane is sometimes used as a roosting-place by flocks in autumn and winter.

GREY WAGTAIL (*Motacilla c. cinerea*, Tunst.).—Very scarce visitor. One seen April 2nd, 1922.

YELLOW WAGTAIL (*Motacilla flava rayi*, Bona.).—Summer visitor and by far the most common species of wagtail in this locality. Nests annually on the grass-covered embankments, where I have observed the young being fed. 1 once counted 39 of this species on the telegraph wires by "Warwick East."

MEADOW PIPIT (*Anthus pratensis*, L.).—Regular autumn and winter visitor.

BRITISH GREAT TITMOUSE (*Parus major newtoni*, Prazák.).—Fairly common resident.

BRITISH COAL TITMOUSE (*Parus ater britannicus*, S. and D.).—Scarce resident, seen occasionally in the willows on both sides of the lane.

BRITISH BLUE TITMOUSE (*Parus caeruleus obscurus*, Prazák.).—A common resident.

SPOTTED FLYCATCHER (*Muscicapa s. striata*, Pall.).—Uncommon summer visitor. One seen June 25th, 1922.

WHITETHROAT (*Sylvia c. communis*, Lath.).—Common summer visitor. Observed carrying nesting material by "Warwick West."

LESSER WHITETHROAT (*Sylvia c. curruca*, L.).—One seen and heard singing, May 4th, 1921.

GARDEN WARBLER (*Sylvia borin*, Bodd.).—Rather uncommon summer visitor; one heard singing on July 25th, 1922.

BLACKCAP (*Sylvia a. atricapilla*, L.).—Summer visitor, often heard singing on the islands of "No 5."

REED WARBLER (*Acrocephalus s. scirpaceus*, Hermann).—Summer visitor. A male of this species accompanied by one young bird just able to fly, seen on June 24th, 1922, and an adult bird seen at the same spot on July 15th. Had a close view of another September 9th, 1928.

SEDGE WARBLER (*Acrocephalus schoenobaenus*, L.).—Summer visitor occasionally heard from end of April to end of June, especially early morning.

WILLOW WARBLER (*Phylloscopus t. trochilus*, L.).—Common summer visitor.

CHIFFCHAFF (*Phylloscopus c. collybita*, Vieill.).—Rather uncommon summer visitor. Heard one singing by "Warwick East," on October 9th, 1921.

MISTLE-THRUSH (*Turdus v. viscivorus*, L.).—Heard singing on the islands on the "Racecourse."

BRITISH SONG THRUSH (*Turdus philomelos clarkii*, Hart.).—Common resident, but scarcer in winter.

REDWING (*Turdus musicus*, L.).—Winter visitor. Small parties occasionally seen passing over.

FIELDFARE (*Turdus pilaris*, L.).—Rather scarce winter visitor.

BLACKBIRD (*Turdus m. merula*, L.).—Common resident.

BRITISH REDBREAST (*Erithacus rubecula melophilus*, Hart.).—Common resident.

BRITISH STONECHAT (*Saxicola torquata hibernans*, Hart.).—Scarce bird of passage. Pair seen, October 29th, 1922, 1 ♂, March 9th, 1 ♂, October 26th, and pair on December 25th and 28th, 1924.

WHINCHAT (*Saxicola r. rubetra*, L.).—Scarce bird of passage. Had a pair under observation in 1922, from the 14th to 17th of April, by "Warwick West," and hoped they would nest. On April 22nd, I could only find the male, and saw neither after that date.

BRITISH HEDGE-SPARROW (*Prunella modularis occidentalis*, Hart.).—Common resident, seldom seen but often heard singing on the islands.

WREN (*Troglodytes t. troglodytes*, L.).—Resident. Song heard on the islands.

SWALLOW (*Hirundo r. rustica*, L.).—Summer visitor. Not very common, but at least one pair reared young in 1923 and 1924.

MARTIN (*Delichon u. urbica*, L.).—Rather scarce spring and autumn visitor.

SAND-MARTIN (*Riparia r. riparia*, L.).—Spring and autumn visitor. Small parties seen in April and May. In August I have counted over 100 resting on the telegraph wires.

CUCKOO (*Cuculus c. canorus*, L.).—Summer visitor, heard and seen occasionally. One calling on an island on the "Racecourse," June 22nd, 1928.

SWIFT (*Micropus a. apus*, L.).—Summer visitor. Numbers vary greatly from year to year. In 1922 saw 2 over "No 5" on April 28th, and in 1923 there were 2 over "Warwick West" on April 22nd, very early dates. One seen over "No 5" August 31st, 1924.

KINGFISHER (*Alcedo atthis isipda*, L.).—Shy resident, seen on July 27th, 1921; April 17th and 28th, 1922; April 20th, July 17th, August 28th, and October 11th, 1924.

KESTREL (*Falco t. tinnunculus*, L.).—Resident, often seen hovering above the banks or circling round the islands. Five seen together on August 28th, 1921.

CORMORANT (*Phalacrocorax carbo*, L.).—Visits the reservoirs occasionally in autumn. On September 12th, 1920, I observed 2 immature birds swimming and diving on "No 5" and another resting on an island on the "Racecourse." In 1921 there were 2 cormorants on an island on the "Racecourse" on August 28th, and on the same island, 2 on September 6th, and 1 on October 1st.

MUTE SWAN (*Cygnus olor*, Gmel.).—Each reservoir appears to have a resident pair, and those on "No 5" brought off a family of 7 in 1920.

MALLARD (*Anas p. platyrhynchos*, L.).—Common resident, whose numbers greatly increase in late summer and autumn, when I have counted from 150 to 200 or more. A few broods are brought off every season.

TEAL (*Querquedula c. crecca*, L.).—Uncommon visitor, only observed once, June 18th, 1924, when I had a clear view through my glasses, of 3 ♂ on the "Racecourse."

SHOVELER (*Spatula clypeata*, L.).—Occasional visitor. One male observed on the "Racecourse" on March 2nd, 9th, and 30th, April 5th, and June 18th, 1924.

POCHARD (*Nyroca f. ferina*, L.).—Occurs all the year round, but not nearly so numerous as the Mallard. Although only 2 or 3 may be seen in May and June, I have seen 80 in April and over 90 in December.

SCAUP (*Nyroca m. marila*, L.).—Very rare visitor. A male was seen in March 1924, and I first saw it on March 29th and also on April 5th. I observed it on various dates in May, June, July and August, on the "Racecourse." On September 28th and October 12th it was on "No 5," and on every occasion I found it in the company of Tufted Ducks.

TUFTED DUCK (*Nyroca fuligula*, L.).—Common resident. A few broods hatched every season, and in winter I have counted 114 on the "Racecourse" and 70 more on "No 5." The great majority were males.

GOLDEN-EYE (*Glaucionetta c. clangula*, L.).—Rare winter visitor. On February 8th, 1924, a pair were on the "Racecourse," while on February 9th, 10th and 14th, 2 ♂ and 1 ♀ were on the same water, and 1 ♂ on March 2nd.

GOOSANDER (*Mergus m. merganser*, L.).—Rare winter visitor. I saw a female swimming and diving on the "Racecourse" on February 10th, 1924. On the 17th, I had a clearer view of presumably the same bird, on "No 5."

SMEW (*Mergellus albellus*, L.).—Rare winter visitor. On February 9th, 1924, there were 5 on "No 5," 2 white ♂ and three immature ♂ or ♀. On February 16th, I could only find one, but there were

2 white ♂ and 7 others there the following day. On February 24th, another member of the society and I saw 12 on the same reservoir, two of them being white ♂. There were still 6 of these birds on "No 5" on March 2nd. I found 4 (1 of them a white ♂) on the same reservoir on December 25th and 26th, 1924.

HERON (*Ardea c. cinerea*, L.).—Resident, seen in varying numbers throughout the year. Nests on the trees on certain of the islands, and from the lane I have seen the sitting bird and later the young in the nest. I have counted 30 herons at one time, and in 1922, 10 pairs nested there.

COMMON SNIPE (*Gallinago gallinago*, L.).—Irregular visitor, observed on two occasions, June 7th, 1921, and September 20th, 1924.

REDSHANK (*Tringa t. totanus*, L.).—Passage migrant seen in February, April, May, June and October.

COMMON SANDPIPER (*Tringa hypoleucos*, L.).—Spring and autumn bird of passage, more often heard than seen. Observed in August most seasons, but on September 3rd, 1921, I had a good view of 6 on an island on the "Racecourse." On April 27th, 1924, I got within 8 or 4 yards of two by the side of the "Racecourse."

GREEN SANDPIPER (*Tringa ochropus*, L.).—Rare visitor, one seen on the "Racecourse," August 28th, 1924, and another on "No 5," September 6th, 1924.

LAPWING (*Vanellus vanellus*, L.).—Resident, one or two may be seen at times or perhaps a dozen, while I have observed flocks of 40 or 50 passing over.

COMMON GULL (*Larus canus*, L.).—Rare visitor. I had a close view of one swimming on the "Racecourse" on April 30th, and again on May 6th and 7th, 1922.

LESSER BLACK-BACKED GULL (*Larus f. fuscus*, L.).—A rare visitor. My only record is of one seen on the "Racecourse" on February 10th, 1924.

BLACK-HEADED GULL (*Larus r. ridibundus*, L.).—Only a few to be seen during the nesting season, but flocks of 70 to 100 or more may be observed at other times.

TERN (Species uncertain?) Two terns were observed flying over "No 5" and the "Racecourse" by two other members of the Society and myself on October 11th, 1924. Next day I had still better views of them and concluded they were Common or Arctic Terns.

GREAT CRESTED GREBE (*Podiceps c. cristatus*, L.).—Resident. Occurred here for many years and I have observed, with the aid of glasses, the nest-building, the eggs (on two occasions) and also the feeding of the young. A few remain throughout the winter, now that the shooting has been abolished, while in August I have counted as many as 50.

RED-NECKED GREBE (*Podiceps grisegna*, Bodd.).—Rare visitor, first recognised here in 1924. On February 3rd, 10th, 16th, and 17th, there were 2 on the "Racecourse." Then on February 9th, and 24th, I saw one only, and on the last occasion, when another member of the Society was with me, we particularly noticed how this bird leapt upwards and forwards quite clear of the water, when about to dive.

LITTLE GREBE (*Podiceps r. ruficollis*, L.).—Not often met with at the reservoirs. I never saw it here until 1924, and then on January 6th, I saw one on "No 5," and in February one on the "Racecourse" on two occasions. Then I observed 4 on the "Racecourse" on December 20th, and another on "No 5" on December 28th.

MOOR-HEN (*Gallinula c. chloropus*, L.).—Resident, but not so common as one would expect, and it is seldom that more than one or two can be found. The greatest number of adults and young seen at one time was 19, and this was in August.

COOT (*Fulca a. atra*, L.).—Resident, met with in far greater numbers than the moor-hen, in many months of the year. I have seen young in down on several occasions, and as late as August 5th, 1924, I observed a coot on a nest on the "Racecourse." During winter months one can often see 100 or more on the "Racecourse."

RING DOVE (*Columba p. palumbus*, L.).—Resident, often seen flying about from one island to another, and I have seen young birds of the year amongst the grass on the embankments.

TURTLE DOVE (*Streptopelia t. turtur* L.).—Said to occur every summer, but my only record is of one whose purring notes I heard quite distinctly about 10 a.m. on May 18th, 1922. This bird was apparently amongst the trees just beyond "No 5" reservoir.

COUNCIL'S REPORT

THE Council has pleasure in presenting to the members the eleventh annual report on the activities of the Society since its reconstruction under the present name.

The question of income is of paramount importance and therefore receives first consideration. An analysis of the financial position from year to year is not easy. The income derived from subscriptions and entrance fees in the year under consideration is some £10 less than in 1923, but on the other hand the Treasurer reports that the percentage of members paying subscriptions is better than it has been for some years. It should be borne in mind that the number of names on our membership list is practically the same as in the previous year. The total income for general purposes amounts to £43 14s. 8d. and our expenses have amounted to £42 16s., leaving, with a sum of £16 4s. 7d. brought forward from the previous year, a credit balance of £17 2s. 10d. As in past years it has been decided, on grounds of economy, not to publish the balance sheet, but the Treasurer will be pleased to submit a copy to any member making application.

During the course of the year we have lost from various causes 7 members, 5 associates, and 1 country associate. On the other hand 11 members, 2 associates and one country associate have joined the Society, and an ordinary member has compounded for life. During the past five years the average number of members elected annually has been eleven. The maintenance of this figure would probably ensure a measure of headway, but to enable the Society to make material progress there must be a greater annual accession to our ranks, and all sections of the Society are invited to put forward a special effort in this direction.

The state of the attendances at Winchester House is most satisfactory and encouraging. On occasion the seating capacity of the room has been fully tested. The continued improvement, which has been achieved, is gratifying, and the Council feels that the members are to be congratulated on this result. The average figure this year is 82.2 against 81.4 in the preceding twelve months. The improvement in the attendances should be of practical assistance to the Society, as the assurance of a good audience is an inducement to lecturers.

The different sections between them have held 29 field meetings. These meetings, conducted on suitable lines, present the surest road along which the Society may progress. There is a real need for meetings at which instruction in the elements of practical natural history may be obtained.

Two notable changes in the officers of the Society will be observed

in the coming year. These are caused by the resignation of Mr. E. B. Bishop and Mr. J. Ross. Mr. Bishop has been President of the Society for four years, and it may be said that he has acted as leader with conspicuous success. The enthusiastic and conscientious manner with which he has carried out his duties cannot be without influence on the Society's work. Unfortunately, as Mr. Bishop has retired from business, he will not be often in our midst, and the opportunity is taken to wish him a long and happy retirement. Mr. Ross has acted as Syllabus Secretary for $3\frac{1}{2}$ years. He had not long completed his duties as General Secretary when he loyally consented to accept this office at a difficult moment. It was said that the association of Mr. Ross's name with the position was an assurance, and so it has been, for his duties have been carried out with the utmost efficiency. Not once during his term of office has the syllabus been late.

The Chingford Branch continues to hold well attended meetings, under the capable guidance of Messrs A. G. Hubbard and E. Samuelson. Unfortunately the chairman, Mr. Hubbard, has not been able to officiate for a brief period on account of serious ill health. The Council desires to express its sympathy with Mr. Hubbard and to wish him a good recovery.

How to improve the Society is a question which must always engross our attention. Academic discussions have been held and may have their uses, but no tangible result has accrued. Efficiency, the very highest degree of efficiency, in all departments, and this cannot be over emphasised, is what is necessary.

WILLIAM E. GLEGG, *Hon. Sec.*

REPORTS OF THE SECTIONS

PLANT GALL SECTION

MEMBERS of this section have done good work during the past year, and the list of galls reported includes over eighty that were not in Mr. Swanton's book published twelve years ago, and several that are not mentioned by Dr. Houard. Among the more interesting are the following:—

Barbarea verna, Aschers, galled by *Dasyneura sisymbrii*, Schrank, from Hayling Island. (E. B. Bishop).

Arabis glabra, Bernh., galled by *Aphis* sp. from near Godalming. (E.B.B.)

Viola hirta, Linn., galled by *Eriophyes violae*, Nal. Box Hill.

Cerastium viscosum, Linn., galled by *Brachycolus stellariae*, Hardy, Greatham Common, Sussex.

Tilia vulgaris, Hayne, galled by *Perrisia thomasiana*, Kieff. Chiswick.

Geranium molle, Linn. Leaves distorted, puckered, and folded; densely covered with white hairs, amongst which were numbers of *Eriophyes*. Sussex, October. In the rootstock were Eelworms.

Erodium cicutarium, L'Herit. Young leaves at the summit of the rootstock swarming with *Eriophyes*. The rootstocks themselves were attacked by two species of Eelworms. Sussex.

Acer Pseudo-platanus, Linn. (1) Specimens of the galls attributed by Dr. Houard to "Insecte," Nos. 3980 and 3981 have been under observation from the beginning of June to the end of October in seven places near London, and microscopical examinations have been made at intervals. These have yielded *Eriophyes*, adults and eggs, and there seems no reason for attributing the existence of the galls to any other agency than mites. The mites have been compared with *Eriophyes macrorrhynchus* obtained from other galls the same evening, and the two species are different in colour and size.

The galls are extremely variable in shape and size, but all gradations have been observed, one form shading into another, from the simple pillar-like gall to the wide-mouthed pyramid or tent-shaped form. They are sometimes to be seen on the petiole of the leaf and then there is no opening. The larger galls distort the lamina of the leaf to a considerable extent. In colour these galls are not so bright as those of *E. macrorrhynchus*, being green or green tinged with red instead of crimson.

(2) Patches of clubbed hairs on the under surface of the leaves. Possibly corresponds with Dr. Houard's No. 3976, "*Eriophyide*," but no mites discovered under the microscope. Surrey. July.

(3) Dense fringes of light-coloured hairs on the sides of the veins on the under surface of the leaves. *Phyllocoptes*. Surrey.

(4) *Eriophyes macrochelus*, Nal., var. *erinea*, Trotter. Sussex.

(5) Concavities on the under surface of the leaves, due to *Aphides*. Chiswick. July.

Acer campestre, Linn. (1) Hairs similar to those on *A. Pseudo-platanus* (No. 3 above). Only one *Eriophyes* was seen on microscopical examination, and no *Phyllocoptes*. Sussex.

(2) Axillary hairs in tufts. *Phyllocoptes acericola*, Nal. Sussex.

(3) *Perrisia acerisrapsans*, Kieff., var. *rubella*, Kieff. Sussex.

(4) *Contarinia acerplicans*, Kieff. Sussex.

Aesculus hippocastanum, Linn. *Eriophyes hippocastani*, Fockeu. Seems to be plentiful on trees round Leatherhead, and the mites were also detected on leaves from near Broxbourne, Herts.

Trifolium repens, Linn. Proliferation due to *Tylenchus devastatrix*, Kuhn, in the stems. Surrey and Middlesex.

Lotus uliginosus, Schkuhr. *Contarinia Barbichei*, Kieff. Bucks.

Vicia hirsuta, Gray. *Perrisia viciae*, Kieff. Sussex.

V. tetrasperma, Moench. *Eriophyes plicator*, Nal., var. *trifolii*, Nal.

Amygdalus persica, Linn. Concavities on the under surface of the leaves, which look like the work of *Eriophyes*, but the galls were too dry and withered when they reached me. Surrey.

Rubus idaeus, Linn. The *Cecidomyid* galls previously recorded from Yorkshire, and last year from Surrey, were found also in Sussex this year.

Rosa micrantha, Sm. *Rhodites rosae*, Linn. Surrey.

Crataegus monogyna, Jacq. Midribs of the leaves swollen and thickened. Nothing detected on examination. Surrey. (J. C. Robbins.)

Peucedanum sativum, Benth. and Hook., fil. Leaflets folded upwards. *Cecidomyid*. Surrey.

Viburnum lantana, Linn. Aborted flower due to either *Contarinia lonicarum*, F. Low., or *C. viburni*, Kieff. Determination impossible as the larvae had vacated the galls. Surrey. (J.C.R.)

Galium cruciata, Scop. Top of the shoots unopened and abnormal in appearance. Occupied by colourless *Aphides*. Surrey.

G. erectum, Huds. *Perrisia*. (Houard, No. 7872). Sussex.

Artemisia Absinthium, Linn. Leaves curled by a pale-coloured *Aphis*.

Serratula tinctoria, Linn. *Eriophyes centaureae*, Nal. Cornwall. (E.B.B.)

Centaurea Scabiosa, Linn. *Aulax Rogenhoferi*, Wachtl. On the top of the South Downs, Sussex.

Hypochaeris radicata, Linn. Heads aborted by pinkish-red larvae of a *Cecidomyid*. Surrey.

Phyteuma orbiculare, Linn. Florets distorted by *Thrips*. Surrey.

Lysimachia vulgaris, Linn. Flower buds aborted. Larvae pupate in the galls. *Cecidomyid*. Surrey.

Solanum dulcamara, Linn. *Eriophyes cladophthirus*, Nal. Hants. (E.B.B.)

Pedicularis palustris, Linn. Rachis swollen. Eelworms. Sussex.
Ajuga reptans, Linn. Leaves curled upwards to form a funnel,
 caused by *Aphides*.

Ulmus glabra, Huds. (1) Leaves curled downwards, containing
 blue-grey *Aphides*. Bucks. (2) *Eriophyes*. (Houard, No. 2044).
 Surrey, two places.

U. campestris, Linn. (1) *Eriophyes*. Similar to the last. Surrey.
 (2) Patches of hairs on the lamina of the leaves, under surface, away
 from the veins. Surrey.

Fagus sylvatica, Linn. Leaves distorted, folded upwards with the
 edges in proximity, and with the midrib swollen. In the bottom of
 the folds are white *Cecidomyid* larvae. Surrey. Resembles Dr.
 Houard, No. 1162.

Quercus robur, Linn. A good deal of information was collected
 regarding the galls on the different forms of the Common Oak, which
 it is hoped will be made use of at a later date.

Salix pentandra, Linn. The *Eriophyes triradiatus*, Nal. galls are
 spreading on the clump of trees on Wimbledon Common.

S. triandra, Linn. *Pontania proxima*, Lepel. Sussex.

S. fragilis, Linn. *E. triradiatus*, Nal., was observed up the Lea
 and Stort Valleys as far as Stansted. (L. B. Hall.), and also at
 Whittlesea and by the River Ouse at Ely. (E.B.B., and Mrs. Wilde.)

S. alba, Linn. *Rhabdophaga albipennis*, Winn. Middlesex.

S. alba × *fragilis*. (1) *Pontania proxima*, Lepel. (2) *Perrisia*
terminalis, H. Low. (3) *Eriophyes triradiatus*, Nal. (4) *Eriophyes* sp.
 (Houard, No. 53.) All Surrey.

S. purpurea, Linn. Leaf buds aborted. *Cecidomyid* larvae and
 pupae in the galls. Surrey.

S. cinerea, Linn. *Eriophyes triradiatus*, Nal. Middlesex and
 Surrey.

S. repens, Linn. Female catkins persisting; occupied by yellow
 larvae, *Rhabdophaga heterobia*, H. Low. Surrey.

Populus alba × *tremula* (*canescens*, Sm.) (1) *Saperda populnea*, Linn.
 (2) *Harmandia petioli*, Kieff, (3) *Perrisia populeti*, Rubs. All Sussex.
P. nigra, Linn. *Trichiocampus riminalis*, Fall., pouches on both the
 lamina of the leaf and the petiole. (L.B.H.)

Pemphigus galls of all species were scarce last season.

H. J. BURKILL, Hon. Sec. and Recorder.

BOTANICAL SECTION

THE annual meeting of the section was held on September 2nd,
 when the following officers were elected for 1925:—Chairman
 and Secretary, R. W. Robbins; Minuting Secretary, L. J.
 Tremayne; Recorder, E. B. Bishop.

During the year the section was responsible for one lecture at an
 ordinary meeting, viz:—May 6th, "Flora of the Limpsfield District,"
 by R. W. Robbins. The two sectional meetings were occupied by
 discussions on the orders *Carophyllaceae* and *Campanulaceae* respectively.

The annual week-end at the end of May was spent at Fittleworth, Sussex, and was much appreciated by those present. The most interesting plants observed were *Ranunculus lingua*, L., *Viola canina*, L., var. *calcareae*, Reichb.; also a pure white flowered form of the same species. *Rubia peregrina*, L., near Bignor. The district seemed rich in ferns; *Lastrea filix-mas* var. *paleacea*, Moore, and *Asplenium adiantum-nigrum* var. *acutum*, Bory, were noted.

Further field meetings were held as follows, all within the Society's district, the most interesting plants observed being set out in each case:—

April 12th, Oxted. Leader R. W. Robbins. *Helleborus viridis*, L., var. *occidentalis* (Reuter), in abundance over an area of about an acre, there being nothing to suggest that it is not native.

May 10th and 31st, Petersham Gravel Pits. Leader, H. J. Burkill.—*Cerastium arvense* L., *Saxifraga granulata*, L., *Potentilla argentea*, L., and *Erysimum cheiranthoides*, L., were the most interesting plants.

May 11th, and June 1st, Thames-side Flora. Leaders, H. J. Burkill and L. G. Tremayne.

June 17th, Wimbledon Common. Leader, H. J. Burkill.—*Corydalis claviculata*, DC., and the Marsh Orchis were found in their old ground. The latter was identified as *Orchis pratermissa*, Druce. Two startling discoveries were *Glaux maritima*, L., and *Plantago maritima*, L., both evidently accidentally introduced on the golf links, either by turf or sand, but flourishing. It will be interesting to note how long they persist. A fine specimen of the Hawk-moth *Chasrocampa elpenor*, L., was found.

July 19th, Reigate Heath. Leader, J. E. S. Dallas.—*Rubus plicatus*, Wh. and N. *Menyanthes*, *Salix aurita*, L., *Sagina ciliata*, Fr., were the most noteworthy.

August 16th, Fulmer, Bucks. Leader, H. J. Burkill.—*Geranium lucidum*, L., *Gnaphalium sylvaticum*, L., *Quercus pedunculata*, Ehrh., × *sessiliflora*, Salish., and *Juncus effusus*, L., × *inflexus*, L.

September 20th, Woldingham. Leader, R. W. Robbins.—Including a walk round Limsfield and Oxted. Various Roses, including *Rosa tomentosa*, Sm., and *R. micrantha*, Sm., *Monotropa*, *Linum angustifolium*, Huds., *Galium Vaillantii*, DC., *Sparganium neglectum*, Ruby., *Mentha gentilis*, L. and *M. piperita*, L.

October 11th, Broxbourne. Leader, E. B. Bishop.—*Potentilla reptans*, L., var. *microphylla*, Tratt., and *P. argentea*, L.

Other noteworthy plants observed in the Society's district include *Silene noctiflora*, L., *Rosa cuspidatoides*, Crépín, *Galium Vaillantii*, DC., *Juncus tenuis*, Willd., *Sparganium neglectum*, Beeby. All found round about Limsfield by R. W. Robbins, and a feebly-armed form of *Pieris schiodes*, L., approaching var. *mollis*, Dub., recorded by W. Biddiscombe from near Mitcham. Of the above *Juncus tenuis* it is worth stating that a group of 5 seedling plants have appeared on the edge of a pond, in an area where the plant was previously unknown to our recorders. The identity of the species has been established.

Outside the district, Mrs. C. L. Wilde has recorded *Bupleurum rotundifolium*, L., as a weed in a garden at Godalming. Mr. H. J. Burkill found at Wimbish, Essex, *Viola hirta*, L., f. *imberbis*, Gregory.

During the year 9 new species have been added to the records of the northern portion of the Society's area. For the southern portion 11 new species have been added, including, in addition to some previously mentioned in this report, *Rubus corylifolius*, Sm., \times *rusticanus*, Merc., and *Poa compressa*, L.

The last summarised statement of records of plants found by members in the Society's district was embodied in the report for 1920, consequently the following will be of interest as showing the progress made during the last four years. As on the previous occasion, the totals include a few hybrids and well-marked varieties, and a fair number of casuals.

NORTHERN PORTION.

Total species, etc., 829.

1. Colnbrook	977	7. Enfield Chase	452
2. Rickmansworth	989	8. Lea Valley	825
3. Hounslow	857	9. Epping	518
4. Harrow	522	10. Hainault	270
5. Mimms	369	11. Brentwood	380
6. Hampstead	877	12. Rainham	340

115 species recorded in all of the sub-districts.

SOUTHERN PORTION.

Total species, etc., 917.

1. Weybridge	885	7. Holmesdale	571
2. Wimbledon	246	8. Blackheath	549
3. Chessington	288	9. Kent Marshes	185
4. Norwood	192	10. Darenth	310
5. Banstead	430	11. North Downs	819
6. Caterham	331	12. Westerham	248

81 species recorded in all of the sub-districts.

A comparison of these figures with those of 1920, shows, as was to be expected, that the southern portion has, in many respects, overtaken the northern, but the small number of species recorded from all the southern sub-districts as compared with the northern, shows that very many of our commonest species must have been overlooked in the former.

Lists from all parts of the area, including even the most common species, stating the exact locality, sub-district and date of observation, with specimens (other than those of common species) whenever possible, will be welcomed by the Recorder (Mr. E. B. Bishop, Lindfield, Marshall Road, Godalming). If lists can be arranged in order of London Catalogue (10th edition) the work of the Recorder will be simplified.

R. W. ROBBINS, *Chairman*.

ARCHAEOLOGICAL SECTION

DURING the year four sectional meetings were held, and three formal and four informal inspections were made. In addition to these the annual week-end was held at Fareham, Hants. Short accounts of the inspections, with dates, will be found on pp. 12-14. The sectional meetings were as follows: April 1st, Discussion of Records; May 8rd, at Fareham, Discussion of Porchester Castle; October 14th, Mr. Stowell gave a paper on "Market Crosses, their Origin and Uses," the substance of which is printed on pp. 19-21; November 18th, Annual Business Meeting.

The outstanding event of the year was the annual week-end, at Fareham, in May, when Porchester Castle was visited under the leadership of Dr. Simpson. The success of this most enjoyable occasion was due entirely to the immense amount of trouble taken by Dr. Simpson in preliminary research and the making of arrangements. The results of his labours can be seen in the magnificent record which he has prepared, and which, it is greatly to be hoped, may be published at an early date.

The fifth annual dinner was held at the Ship Restaurant, Whitehall, on February 16th, 1924.

Four papers were provided by the section at general meetings. Two of these were by members: "Old Buildings in Italy" by Mr. Chapman, on March 4th, and "Tournai Cathedral" by Mr. Forster, on May 20th. At the annual exhibition, on February 5th, Mr. Palmer gave a short paper on Inca remains in Peru, and on September 16th, Mr. E. W. Harvey-Piper gave his lecture "My Recent Visit to Vesuvius and Pompeii." The Section is greatly indebted to both these gentlemen.

At the end of 1924 the membership of the Section stood at 28, an increase of 2 on the previous year. Of these 21 attended at least one meeting or excursion, while 13 contributed to the various records.

J. C. ROBBINS, *Secretary*.

ORNITHOLOGICAL SECTION

THE annual meeting of the section was held on December 2nd, 1924, when the following members were elected to form the Committee for 1925:—Chairman, W. E. Glegg, F.Z.S., M.B.O.U.; Secretary, J. P. Hardiman, B.A., C.B.E.; Recorder, A. Brown; Members of Committee, S. Austin, C. S. Bayne, J. E. S. Dallas, P. J. Hanson, and Miss H. Watkins. Mr. J. E. S. Dallas was again elected to represent the Section on the Publication Committee, and Mr. C. S. Bayne to represent it on the Publicity Committee of the Royal Society for the Protection of Birds.

The section provided the following papers for the Society's syllabus, which were read at central meetings:—February 19th, "Cuckoo's

Eggs and Evolution," by Mr. E. C. Stuart Baker, O.B.E., J.P., etc. (Hon. Sec. B.O.U.) Part I.; and November 4th, Part II. On the latter date the lecturer's unique collection of cuckoos' eggs was exhibited.

SECTIONAL MEETINGS

Four sectional meetings were held, at which the following papers were read, *viz.*:—January 15th, Mr. C. S. Bayne, "Ornithological Notes, with special reference to the courtship habits of birds"; April 1st, "Some Birds of Switzerland on Mountain and Lowland," by Miss Hibbert Ware, F.L.S.; September 2nd, "The Birds of the Limpsfield District," by Mr. R. W. Robbins; and "Some Notes on North Irish Birds," by Mr. S. Austin.

At the Chingford Branch of the Society an ornithological lecture was delivered on November 10th, on "Birds of a Rocky Seashore," by Miss Hibbert Ware, F.L.S.

On February 2nd the members of the section visited the Ornithological Department of the British Museum, Mr. N. B. Kinnear, C.M.Z.S., M.B.O.U., indicating especially types of Indian Cuckoos and their fosterers.

The programme of monthly field meetings was successfully carried through, the following visits being made:—

DATE.		DISTRICT.	LEADER.
January	27.	Staines	C. S. Bayne.
February	24.	Essex Marshes	W. E. Glegg.
March	30.	Chipstead	J. E. S. Dallas.
April	27.	Rainham, Kent	C. H. Payne.
May	25.	Wisley Common	Miss H. Watkins.
June	29.	Epping Forest	J. Ross.
July	27.	Enfield	H. Sugar.
August	31.	Essex Marshes	W. E. Glegg.
September	28.	Hatfield Forest	J. P. Hardiman.
October	26.	Harrow, Stanmore, Pinner	L. J. Tremayne.
November	30.	Tring	P. J. Hanson.
December	28.	Navestock	S. Austin.

The Committee held five meetings during the year.

BIRD RINGING

During 1924 the section sent in 218 schedules under the "British Birds" marking scheme, the work in this connexion being materially helped by our correspondent, Miss F. Collins. The recovery of one marked bird was reported; an adult Swift, ringed by Mr. Beadell (for Mr. J. E. S. Dallas) at the nesting site in a roof at Warlingham, Surrey, on July 28th, 1922, being recovered on its return to nest at the same site in 1923.

The photographic collection stands at 144 sheets. No photos were added during the year.

The section suggested that the Royal Society for the Protection of Birds should urge the National Trust for Places of Historic Interest or

Natural Beauty to afford protection to the water birds on the lake in the Hatfield Forest Trust Estate. The R.S.P.B. replied that their Council would adopt the suggestion. The result of the action taken is not yet known.

NEW SPECIES

Five species new to the Society's district have been recorded, making the total number 177. These new occurrences were:—*Lullula arborea arborea* (Wood-Lark), on March 9th, at Mickleham Downs. A flock of five birds were seen, two in very fine plumage. They kept much together, but were confiding and did not fly far when disturbed; reported by J. E. S. Dallas. *Acrocephalus paludicola* (Aquatic Warbler); on September 7th a long observation of this bird was had at near range. It was on a small bush on the south side of the path between the two reservoirs at Staines; reported by Donald Gunn, per A. Holte Macpherson. *Netta rufina* (Red-crested Pochard), on February 16th, at Walthamstow Reservoirs, one ♂ seen; reported by W. E. Glegg (see "British Birds," vol. 18, p. 310). *Podiceps griseigena griseigena* (Red-necked Grebe), on February 2nd, 3rd, 9th, 10th, 16th, 17th, 23rd, and 24th, and March 1st, 2nd, and 9th, at Walthamstow Reservoirs; reported by A. Brown and R. Pethen. *Podiceps auritus* (Slavonian Grebe), one seen on March 9th, at Staines Reservoir, and another from October 5th to 12th, at Barn Elms Reservoirs; both reported by A. Holte Macpherson.

INTERESTING RECORDS

Other interesting records for the year are as follows:—*Pica pica pica* (Magpie), March 9th-11th, and April 3rd, at Church Cobham, and May 25th, between Weybridge and Wisley Common; reported by J. P. Hardiman. March 28th, one seen flying with two carrion crows from island in Serpentine, Hyde Park; reported by R. W. Pethen. *Passer montanus montanus* (Tree Sparrow), five seen by Walthamstow Reservoirs, October 15th; reported by R. W. Pethen. *Fringilla montifringilla* (Brambling), March 30th, between Tadworth and Chipstead; reported by S. Austin. *Bombeylla garrulus* (Waxwing), one frequented a tree in the garden of the Church House, Walthamstow, January 19th-21st; reported by the Rev. J. H. Keen, per W. E. Glegg (see "British Birds," vol. 17, p. 316). Another observed at Beckenham, March 1st; recorded by H. A. A. Dombrain in "British Birds," vol. 17, p. 275. *Anthus spinoletta petrosus* (Rock-Pipit), January 6th, at Staines Reservoir; reported by C. S. Bayne and J. P. Hardiman; March 23rd, two reported at same place by Dr. N. H. Joy, per W. E. Glegg. *Motacilla cinerea cinerea* (Gray Wagtail), January 6th, Staines Reservoir; reported by C. S. Bayne and J. P. Hardiman; August 10th, at same place, "Wagtails in large numbers, species mostly grey"; reported by Donald Gunn, per A. Holte Macpherson. *Motacilla flava rayi* (Yellow Wagtail), October 11th (late date), three at Staines Reservoir; reported by A. Holte Macpherson. *Turdus torquatus torquatus* (Ring-Ouzel), September 27th, ♂, Spring-

field Park, Clapton; reported by R. W. Pethen. *Saxicola torquata hibernans* (British Stonechat), March 80th, between Tadworth and Chipstead; reported by J. P. Hardiman. October 18th, ♂, Upminster Common; reported by W. E. Glegg. *Oenanthe oenanthe oenanthe* (Wheatear), April 25th, between Perivale and Northholt; reported by J. P. Hardiman. May 15th, Botany Bay, Enfield, and August 80th, King George Reservoir, Chingford; reported by W. E. Glegg. *Phalacrocorax carbo carbo* (Cormorant), August 9th, Walthamstow Reservoir; reported by W. E. Glegg. August 9th and 10th, Staines Reservoir; reported by Donald Gunn, per A. Holte Macpherson. *Querquedula crecca crecca* (Teal), February 9th, many ♂ and ♀, King George Reservoir, Chingford; reported by W. E. Glegg. March 9th-11th, Cobham, and May 25th, between Weybridge and Wisley Common; reported by J. P. Hardiman. June 18th, three ♂, Walthamstow Reservoir; reported by R. W. Pethen. *Mareca penelope* (Wigeon), February 9th, number of ♂ and ♀, King George Reservoir, Chingford; reported by W. E. Glegg. March 9th, Staines Reservoir; reported by A. Holte Macpherson. March 17th, 20-30, March 22nd, ten, and April 16th, two, Brent Reservoir; reported by J. P. Hardiman. *Spatula clypeata* (Shoveler), observed at Walthamstow Reservoirs on various dates between March 1st and August 9th; reported by A. Brown, W. E. Glegg, and R. W. Pethen. *Nyroca marila marila* (Scaup), December 15th, 1928, Staines Reservoir; reported by A. Holte Macpherson. December 29th, 1928 (two), Staines Reservoir; reported by C. A. Cresswell and Col. Cresswell, per A. Holte Macpherson. February 14th, Serpentine, Hyde Park; reported by A. Holte Macpherson. A ♂ was observed on various dates between March 9th and October 12th, at Walthamstow Reservoirs; reported by A. Brown, W. E. Glegg, and R. W. Pethen. *Glaucionetta clangula clangula* (Golden-eye), February 8rd, 9th, 10th, 14th, and March 2nd, Walthamstow Reservoirs; reported by A. Brown, W. E. Glegg, and R. W. Pethen. February 9th, King George Reservoir, Chingford; reported by W. E. Glegg. March 9th, Staines Reservoir; reported by A. Holte Macpherson. *Mergus merganser merganser* (Goosander), December 26th, 1928, Staines Reservoir, eleven (including two old ♂); reported by A. Holte Macpherson and J. Rudge Harding. January 6th, same place, five ♂ and five ♀; reported by J. P. Hardiman. February 10th, 17th, and 28rd, Walthamstow Reservoirs, one ♂; reported by A. Brown and R. W. Pethen. Staines Reservoir, last seen March 2nd; reported by Donald Gunn, per A. Holte Macpherson. *Mergellus albellus* (Smew), February 10th, "some at the reservoirs between Lonsdale Road and the towpath from Hammersmith Bridge to Barnes," and March 9th, "still to be seen at Chiswick Eyot and near Hammersmith Bridge, chiefly at low tide when there are few boats about"; reported by A. Holte Macpherson. Walthamstow Reservoirs, on various dates between February 9th and March 2nd (numbers varying from one to twelve); reported by A. Brown, W. E. Glegg, and R. W. Pethen (see "British Birds," vol. 17, p. 810). At the same place, on December 25th and 28th, four (including one ♂) seen; reported by R. W. Pethen.

Scolopax rusticola rusticola (Woodcock), November 5th, one seen at Shalter Bushes, Warlies Park; reported by R. S. Archbould, per W. E. Glegg. *Tringa totanus totanus* (Redshank), March 8th, one, Walthamstow Sewage Farm; March 22nd, several, same place; both reported by W. E. Glegg. *Tringa hypoleucos* (Common Sandpiper), Walthamstow Reservoirs, during July, August, and September; reported by R. W. Pethen. August 1st, 9th, and 10th, Staines Reservoirs; reported by Donald Gunn, per A. Holte Macpherson. *Numenius arquata arquata* (Curlew), January 6th, Staines Reservoir; reported by C. S. Bayne and J. P. Hardiman. August 9th and 10th, same place, there were several lots, one of seven birds, but none settled; reported by Donald Gunn, per A. Holte Macpherson. *Tringa ochropus* (Green Sandpiper), February 16th, August 28th, and September 6th, Walthamstow Reservoirs; reported by W. E. Glegg and R. W. Pethen. October 19th, Springfield Park; reported by R. W. Pethen. *Numenius phaeopus phaeopus* (Whimbrel), July 26th, heard at Walthamstow Reservoirs; reported by W. E. Glegg. *Charadrius hiaticula hiaticula* (Ringed Plover), March 8th (heard), September 27th (seen), Walthamstow Sewage Farm; August 9th (heard), Walthamstow Reservoir; all reported by W. E. Glegg. August 9th and 10th, Staines Reservoir; reported by Donald Gunn, per A. Holte Macpherson. *Larus canus canus* (Common Gull), January 6th, Staines Reservoir; reported by C. S. Bayne and J. P. Hardiman. March 19th, 20th, and April 2nd, Regents Park Lake, and March 28th, Serpentine, Hyde Park; reported by R. W. Pethen. *Larus argentatus argentatus* (Herring-Gull), February 10th, Staines Reservoir, big flock; reported by A. Holte Macpherson. March 21st, Brent Reservoir; reported by J. P. Hardiman. February 7th, March 3rd, April 8th, and October 28th, St. James's Park; reported by R. W. Pethen. *Larus marinus* (Greater Black-backed Gull), April 14th, party of seven adults flying over the Thames at Westminster; recorded by H. A. F. Magrath in "British Birds," vol. 18, p. 30. *Colymbus stellatus* (Red-throated Diver), February 16th (one) and March 3rd (two), Walthamstow Reservoir; reported by W. E. Glegg. *Rallus aquaticus aquaticus* (Water-Rail), January 10th, bird found in the playground of the Mercers' School, in Holborn, about 8 a.m. It was unable or unwilling to fly for more than a foot or so high for short distances, but ran rapidly. It was caught, and later taken to the Zoo. The only apparent explanation of how it got into the playground is that it was flying over the surrounding buildings and collided with the telephone wires; reported by G. H. Heath. *Crex crex* (Corn-Crake), July 27th, heard calling several times at 6 p.m., at Rammey Marsh, River Lea, between Enfield and Waltham Locks; reported by R. W. Pethen. *Streptopelia turtur turtur* (Turtle-Dove), September 27th, Walthamstow Reservoirs, reported by W. E. Glegg.

EPPING FOREST REPORT

The special annual review of the bird-life of Epping Forest having ended in 1923, the present Report confines itself to a statement of new and interesting occurrences supplementary to the eight year's summary furnished in the 1923 Report.

Three new species are as follows:—*Anser anser* (Grey Lag-Goose); during a spell of severe weather, one was on the Eagle Pond for two days, February 7th and 8th, 1919; reported by Charles E. Baker, per W. E. Glegg. *Capella gallinago gallinago* (Common Snipe), one flushed on Warren Plain, near grounds of Warren House, December 14th; reported by P. J. Hanson. C. E. Baker, per W. E. Glegg, reports that he has often seen snipe about at Snaresbrook, and that a favourite spot for them in winter is in the marshy ponds between the Snaresbrook Road and the Hollow Ponds. *Alectoris rufa rufa* (Red-legged Partridge), pair with covey of young seen on June 11th, 1919, about 800 yards from the Wake Arms, north of the Theydon Road; reported by C. E. Baker, per W. E. Glegg.

Other interesting records are as follows:—*Emberiza schoeniculus schoeniculus* (Reed Bunting); C. E. Baker, per W. E. Glegg, reports that he had for some years suspected that this species bred in the Forest, as he had seen it about in the breeding season, but in June, 1924, he was fortunate enough to be shown a nest, which contained five eggs. *Motacilla cinerea cinerea* (Grey Wagtail), seen on February 4th and April 18th, at Staples Hill Pond; reported by P. D. Hayward, per S. Austin. *Motacilla flava rayi* (Yellow Wagtail), a pair were seen on September 5th, 1923, at Snaresbrook; reported by C. E. Baker, per W. E. Glegg. *Carine noctua mira* (Little Owl), seen on February 17th, at Staples Hill; reported by Keeper Stubbs, per H. D. Hayward and S. Austin. *Nyroca ferina ferina* (Pochard), one ♂ seen on January 3rd, at Connaught Water; reported by H. C. Playne, per S. Austin. *Scolopax rusticola rusticola* (Woodcock), seen in Forest, near Loughton, on November 5th; reported by R. S. Archbould, per W. E. Glegg. *Larus ridibundus ridibundus* (Black-headed Gull); for several winters past they have visited and remained on the Eagle Pond throughout the winter months, arriving this year on October 28rd; reported by C. E. Baker, per W. E. Glegg. *Podiceps ruficollis ruficollis* (Little Grebe), nested on the Eagle Pond in 1922 and 1924; reported by C. E. Baker, per W. E. Glegg. *Columba aenas* (Stock-Dove), June 29th, nest containing three eggs found at Oak Hill, Theydon, one of the old birds being seen; reported by C. S. Bayne and P. J. Hanson. C. E. Baker, per W. E. Glegg, reports that during the past few years he must have seen almost a dozen nests, and many birds, chiefly in the Theydon district.

Four new members of the Society have joined the section during 1924, viz.:—Miss A. E. Moore, Lady D. Robertson, Messrs. John B. Foster, and E. C. Stuart Baker (Hon. Sec. M.B.O.U.).

We have to acknowledge with thanks the help rendered in our recording by a number of correspondents.

WILLIAM E. GLEGG, *Chairman.*

A. BROWN, *Recorder.*

J. P. HARDIMAN, *Secretary.*

CHINGFORD BRANCH

THE membership of the branch has been well maintained, but, thanks to broadcasting, the attendances have suffered slightly; the highest was 41 and the lowest 9. Lectures were given during the sessions as follows:—"Some Plant Galls," by J. Ross; "Notes on North Queensland," by Dr. Culpin; "Our Earth in the Making," by C. O. Harvey, B.Sc.; "My Swiss Holiday," by J. E. S. Dallas; "Some Sea Shells and Their Habitats," by Rev. H. J. Gamble, M.A.; "The Western Mediterranean," by E. Samuelson; "Old Buildings in Italy," by E. Chapman; "Birds of a Rocky Sea Coast," by Miss Hibbert-Ware, F.L.S.; and the "Zoo Aquarium," by P. W. Horn.

LIST OF MEMBERS

It is particularly requested that Members will inform the Secretary as soon as possible of any change of address

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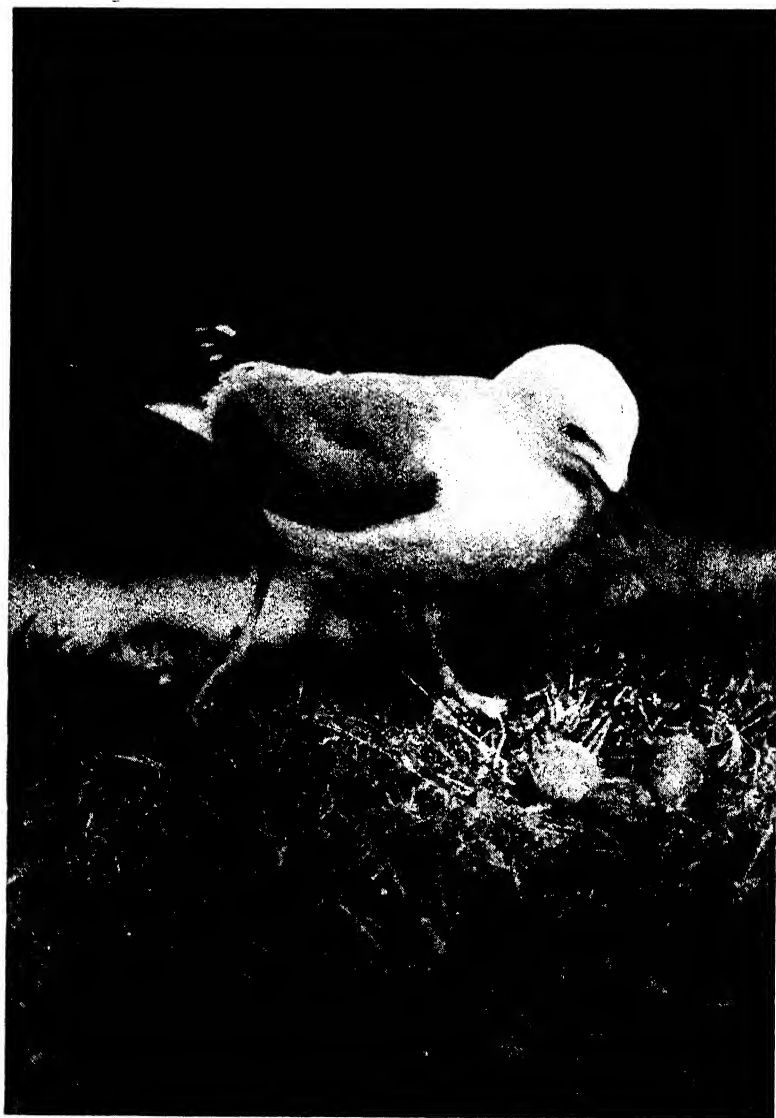
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COMMON GULL

Photographed by W. E. GLEGG, F.Z.S., M.B.O.U., at Noss, Shetland, in 1922.

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INCREASE IN MELANISM IN THE LAST HALF-CENTURY

By A. W. MERA

IN dealing with my subject of recent melanism in British lepidoptera, it may be as well to make some preliminary remarks on the general subject of melanism, before putting forward examples of isolated species which have come under my immediate observation, as having developed a melanic tendency in recent years.

There is no doubt that the lepidoptera in the extreme north of the British Isles frequently show a form of melanism which, I think, no one would attempt to prove was of recent origin; and it is only reasonable to suppose that more than one cause may produce very similar results. The melanism of the northern specimens I look upon as entirely due to atmospheric conditions which doubtless have been unchanged for countless generations, whereas the darkening of many species occurring in the south, I will endeavour to show, is of quite recent growth, and these species all more or less frequent the country around industrial centres.

There was some interesting correspondence in the "Entomologist" some two years ago, by one of our modern and highly scientific entomologists, and by others of very long experience as field naturalists. The contention hinged on a doubt expressed by the first named, as to the fact that a large number of British insects had shown a decided increase of melanism recently; and that where melanism occurred it was probably only a case of reversion to type, as the colours prevailing in all lepidoptera of the earliest forms, were either black or white, with perhaps a few modifications, and that melanism might be classed in the same category as albinism, which when occurring in nature, as it frequently does, is only another instance of reversion to type. Personally I look upon the whole suggestion as somewhat fantastic, as the knowledge we have of the colour of insects in prehistoric times is most slender and almost entirely theoretical. The other writers on the subject hold to the fact that there has been a most pronounced increase of dark forms in recent years in the moths of the British Isles. My personal experience would show that albinos are scarce, and melanics are common, and that there is undoubtedly something at work producing melanism, but not albinism. I would lean to the opinion that albinism in lepidoptera is an indication of want of vigour rather than anything else.

I think I am right in assuming that the generally accepted view of melanism, and every other colour in insects which is conducive to their protection, is the outcome of assimilation to environment, pro-

duced by Natural Selection or otherwise; and as the resting places of insects in the neighbourhood of towns become more smoke begrimed, so we may expect the colour of insects to become darker in those districts. Personally I am not altogether satisfied that the working of Natural Selection is the sole agent accountable for the protective colouration so frequently seen in insect life, and I think there are strong grounds for holding the opinion that there is in many cases of assimilation, an immediate response to environment. I know that this view is not held by a number of naturalists, but with the few examples which have come to my notice I have been led to that conclusion. Bearing on these few remarks, I have an illustration which, although not exactly touching on melanism, may serve as an example of "immediate response to environment," which cannot be the outcome of Natural Selection. This consists of specimens of preserved larvae of *Amphydasis betularia* which were bred by me from the same parentage, producing distinctly different colouration in response to environment. Here we have a clearly different marked protective colour, where the influence of heredity has played no part, as all the larvae were of the same parentage. It would seem that, in a large number of recently melanic forms, the process of change has been abrupt and sudden, but with other species it has been a gradually darkening process, which in the latter case might be compatible with the working out of Natural Selection.

I will now give a list of several species of British lepidoptera that have shown a melanic tendency during the last fifty years or so, but apparently not before, and I will give a few remarks as to when melanism was first seen in them. I do not pretend that the list is exhaustive, as in all cases the specimens alluded to are in my own cabinet, and in most cases they have been either bred or captured by myself.

To begin with, I will refer to *Stauropus fagi*. This insect has two distinct forms, one the typical which is a lightish grey, and another form almost black. This black form was first taken by me at Chalfont in 1907, although I had bred both forms from the Reading district some few years before then. There is no doubt that this melanic form has increased immensely in the home counties of late years, and as a proof of this fact, you may refer to the Doubleday collection in the South Kensington Museum, where there is a long row of specimens all of the normal colour without a single example of the dark var. As Doubleday lived at Epping in one of the principal habitats of this insect, we may safely presume that his specimens came from the adjacent forest. During the last two or three years I have been successful in picking up one or more larvae of *fagi* in Epping Forest all of which produced the black form.

Cymatophora duplaris is another species which appears to produce a dark form more or less spontaneously. This year for the first time I bred an almost shiny black specimen from Epping Forest. This is fully as dark as specimens I have which were taken in the Lancashire Mosses in 1897, but until this year I had seen nothing to equal it from

the London district. Some forty years ago I used to take the species in fair abundance in Coombe Wood, Surrey, which is about as far off the smoke centre of London as is Epping Forest, but in those days I never took one to approach the strongly melanic specimen of this year's production.

The usual form of *Acronycta psi*, which occurs in the London district and for some 20 miles round, is a melanic production (var. *suffusa* of Tutt). This apparently is not a recent development, as its prevailing colour in the London district has only become slightly darker in my recollection. It is an insect which appears to be immune from any deleterious influence of the London atmosphere, as I once found a larva within the city walls of London, under a lime tree which formerly flourished in Tokenhouse Yard. I have never seen this form (var. *suffusa*) where the air is absolutely free from smoke. The lightest specimens of *psi* in my cabinet are from North Cornwall and Devonshire, where doubtless the air is as pure as in any part of England.

I believe it was in the year 1881 that I saw exhibited at the South London Entomological Society a series of *Taenioecampa opima* that had been recently taken on Wanstead Flats. These specimens were all of the type form, being of a somewhat light grey colour but rather strongly marked. It was not until about the year 1900 that I first took the insect from that spot myself, and then the specimens were mostly of a dark slaty colour with only an occasional light grey specimen. Since that date I took the species each year until 1918, when I left the neighbourhood. During that period the tendency was for them to become even more dark, especially during those seasons when the grass was burnt during the early spring. It always seemed to me that those specimens taken when the ground was black through burning, were darker than those when the grass was not burnt, and that there really seemed to be some innate power of response to environment wholly apart from the weeding out process of Natural Selection.

Miselia oxyacanthae is one of the few British insects which has a melanic form of really ancient date. This form was named by Hawarth as another species, and called the "dark crescent," and is now known as *oxyacanthae* var. *capucina*. It is true that recent melanism has settled on the var. *capucina* which is now almost black in Epping Forest, whereas the type appears to be much the same as ever, but perhaps not so numerous as the var. in its various degrees of intensity towards black.

Catocala nupta has shown of quite recent years a form of melanism in a way somewhat difficult to account for. It is a suffusion of the whole of the under wings with dark scaling showing the usual pattern beneath. I have a specimen taken at Loughton in 1918, and a few others have been taken principally in the north of London. As most of us know, the resting habit of this insect is, in a way, such as to hide all trace of the underwings, and we still have to search for the cause of this development as apparently it is in no way protective.

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In touching on the geometers it will be seen that melanism is more in evidence in this group than in the other groups of British lepidoptera, and it may be taken as evidence of its recent origin, by the fact that in Edward Newmian's book on British Moths, published in 1869, there is scarcely any allusion whatever to melanism in the geometers.

Perhaps one of the latest geometers to start a dark form is *Selenia illunaria*. It has evolved this year 1925. It is not a black insect, but an almost unicoloured dark brown with the usual markings very faintly indicated. The insect came from the neighbourhood of Durham, a locality which greatly favours the production of melanism.

Odontopera bidentata has also a unicoloured almost black form. My earliest specimens are dated 1902, and are from Leeds. Doubtless there are other places in the north where this form occurs, but to the best of my knowledge it has not come as far south as London. The odd specimens that I have come across in Epping Forest and elsewhere round London of late years, have all been of a darkish form, but not black, contrasting very greatly with a light specimen I have in my cabinet, taken by me some 50 years ago in Coombe Wood, Surrey.

In various parts of Yorkshire *Phigalia pilosaria* has evolved a black form, and my earliest example is dated 1909. I have been looking for a similar strain in Epping Forest for some years past, but so far, I have seen nothing nearer than a somewhat unicoloured rather thinly scaled brown form, which looks as if it might develop into something more pronounced in the direction of melanism. I believe this insect in the north usually becomes melanic all at once without any gradual growth of darkening.

Amphidasys betularia was the first pronounced example of a British species of the geometers to strike off into a black form without any gradual process of change. It was probably some 60 or 70 years ago, when this black variety first occurred in the manufacturing districts of the north of England, and out of respect to our distinguished British lepidopterist, Henry Doubleday of Epping, this var. was named *doubledayaria*. From that time the var. has gradually increased its range from the north and midland counties, but it was not until 1897 that I recorded my first capture of *doubledayaria* near London, which was in a lane leading to Little Ilford. Almost directly after that date the var. became as common as the type, and now this year 1925 from five wild larvae taken in Epping Forest, each one produced var. *doubledayaria*. Intermediate forms between the type and *doubledayaria* are rare, so that apparently the change has been abrupt and sudden, which is so often the case with melanic forms. As a proof of the rapid change in the colour of this insect, I may say that in 1891 I bred from a captured female in Wanstead Park a long series which did not produce a single var. *doubledayaria*.

Hemerophila abruptaria has a distinctly different dark form, although not black, which I believe is confined to the neighbourhood of London. My specimens are dated 1906, and some few years before then, this variety was considered extremely rare. Now it is comparatively common, more particularly in the north of London. I have

INCREASE IN MELANISM

bred this species several times, both from the type and var. but I have never bred a really intermediate form.

Boarmia repandata has a most pronounced melanic form from Sheffield, which now appears to be the most frequent form in that district. Dark specimens from Durham are closely following those from Sheffield, but those from Durham show the usual markings on a very dark background, whereas the Sheffield specimens are absolutely black. The increase in melanism in this species in Epping Forest has been very pronounced in recent years. I have a few specimens that were taken there by me some forty years ago which are only just moderately dark, but since 1913 all that I have bred or taken have been decidedly darker, and two specimens in particular, one in 1915 and another in 1921 from Loughton, are as dark as the specimens from Sheffield were in 1907, whereas those bred some years later from Sheffield in 1913 are of the absolutely shiny black form. I may add that in breeding these dark forms both from Sheffield and Durham, there was no instance of reversion to type.

The first perfectly black specimen of *Boarmia rhomboidaria* which I ever saw alive was bred by me from a wild larva taken from a hedge at Bexley, Kent, in 1924. Until then I had taken nothing darker than the usual London form var. *perfumaria*, which has been the prevailing form in this district as long as I remember, although perhaps it has gone through some intermediate stages, but the black form from my own neighbourhood has yet to be discovered.

In the next species, *Abietaria*, the type form seems almost to have gone, both from the New Forest and also from Box Hill, as all those that I have bred from these places of late years are of a strongly melanic strain, and many of them are entirely black with only the slightest indication of the usual markings.

It was only last year that I first made the acquaintance of a melanic form of *Boarmia roboraria* in the woods of west Essex, and although this form is not so black as a form that turned up some years ago from the neighbourhood of Coventry (specimens of which were in the cabinet of the late J. C. Capper), it is only yet another clear proof of the spread of melanism in the outer London District.

Boarmia consortaria has a corresponding melanic form, which first came into my possession from Sutton Coldfields in 1918. The last two species appear to be going through a gradual process of melanic evolution. *Tephrosia consonaria* on the other hand, seems to have developed a black form suddenly, which first turned up somewhere in the neighbourhood of Maidstone. I obtained my specimens in 1904 when it was looked upon as quite a rarity, but since that date it has been bred somewhat freely and is now in most of our cabinets.

Next to *Amphidasys betularia* I should look upon *Tephrosia biundulata* (the single brooded species) as being one of the earliest geometers to show a melanic tendency in the midland counties. This dark form I believe first occurred in Delamere Forest and was named *delamerensis*. It was not until the year 1918 that I saw a specimen of *delamerensis* in Epping Forest. Up to about that date the type

was taken pretty freely both in Epping Forest and at Hainault a few miles distant, but I never took a specimen to show any inclination towards melanism until 1918 in either of these localities. The closely allied species *crepuscularia* (the doubled brooded species) does not appear to be so prone to melanism as the preceding species, although the late Major Robertson used to take a dark form at Swansea in more or less recent years. In hybridizing a dark ♂ *biundularia* (Loughton) and type *crepuscularia* (Sussex), the result was a majority of melanics showing that the dark form was again dominant.

Then we have a few species that have gone through a darkening process which was certainly unknown to British collectors fifty years ago. *Ephrya pendularia* first became darker at Market Drayton (my earliest 1898), *Venusia cambricaria* (Sheffield, 1910), *Acidalia incanaria* (London, 1915), *Macaria liturata* (Delamere Forest, 1905). A particularly dark form of *Pidonia atomaria* has occurred in the north. It is entirely black with a white dotted fringe, the usual markings being quite obliterated. My first specimen came from Bury in Lancashire in 1906, and others from Huddersfield in 1919.

The genus *Hibernia* show some very interesting examples of the increase of melanism. The species *leucophaea* has been under observation by me for a good sixty years. I can't say exactly when I first saw a black one, but the earliest in my cabinet is dated 1903, and since then the black form has become increasingly abundant both at Chingford and Richmond Park. I can safely say that as a youth the black form was unknown either in Richmond Park or Coombe Wood, which were then my favourite hunting grounds. *H. progemmaria* has a well known unicoloured dark brown form in many parts of the north of England. This has evolved in modern times. My first melanic specimen came from Leeds in 1903. There has been some increase in the darkening of them in Epping Forest, but not to a very marked degree. In 1921 I took at Loughton a specimen with forewings almost as dark as the Leeds specimens, with the difference that the underwings were almost normal, whereas with the Leeds specimens both upper and underwings are melanic.

Perhaps one of the most recent developments of melanism is in the species *defoliaria*, and as far as I know it has first shown itself in Epping Forest. Specimens now are occasionally taken which are of a unicoloured black form with light fringes, the female being entirely black with the exception of two small ochreous spots just below the head. The first one I succeeded in getting was in 1917. Since then I have bred one or two more, but as most collectors know, it is a particularly obstinate species to breed, for when the larvae go down to pupate that is generally the last that is seen of them.

The genus *Oporabia* show some interesting results in modern melanism. The species *dilatata* produces a London form of a dull unicoloured slaty shade which seems to me to have altered very little in my recollection; but its congener *christii* has evolved a rich shiny black form, which I bred in 1922 together with the pale light type from Buckinghamshire.

There is also a strong melanic form of *autumnaria* which I bred in 1913 with intermediates. These were from ova which were sent to me from Middlesborough.

I hope the foregoing remarks are conclusive evidence enough to show that definite force is at work in altering the colour of British lepidoptera, and I will there leave the subject for further discussion of its various and complicated phases.

ON THE OCCURRENCE OF CERTAIN FERNS IN SURREY

By R. W. ROBBINS.

THE dry chalk, sandy commons and heavy clays of Surrey present no natural situations suitable for the growth of such ferns as the smaller spleenworts and species which are normally to be found in moist rocky situations. Old sheltered walls, whether of stone or brick, are the substitute chosen by the wall rue (*Asplenium Ruta-muraria*, L.), and occasionally by other forms, and it is noticeable how frequently the brickwork of railway stations beneath the edge of the platform, even in the chalk districts, is ornamented by such growth.

In the west of Surrey a cross-country line with an infrequent train service is remarkable for the abundance of ferns below the platforms. In addition to *A. Ruta-muraria*, *A. Trichomanes*, L., is abundant, the hart's-tongue (*Scolopendrium*) is very frequent, and at some stations *Ceterach officinarum*, Willd., grows freely. It is a facile assumption that these ferns have arisen from spores blown from neighbouring gardens, but a discovery I made last summer at a railway station led me to doubt that this was the whole truth. I found among other species a plant of the maidenhair (*Adiantum Capillus-Veneris*, L.) of quite a fair growth and fruiting freely. This delicate fern is not likely to be grown in garden rockeries, as it would not be expected to survive frost. In Europe it is a plant of the western seaboard, from Ireland southwards, and of the Mediterranean area. It is universally distributed in the warmer regions of the world. Its nearest permanent stations are the cliffs of Dorset and South Wales. *Ceterach* also, although hardy, is most at home in Somerset and other western counties. Moreover it is quite noticeable, at these railway stations, that the platforms facing south and west are much the more abundantly supplied with ferns. I have little doubt that the spores from which these plants have sprung were in many cases carried by the strong winds from the south-west to their present situation, and finding there a sufficiency of moisture and shelter, germinated and became established. How long the maidenhair will survive the cold of inland winters is a matter of doubt.

LONDON BIRDS

By A. HOLTE MACPHERSON

SUMMARY OF NOTES IN 1925

○ N January 8th, a Kingfisher flew down the Long Water in Kensington Gardens; a few moments later, a Kestrel settled in an elm tree near the Sanctuary.

January 9th, five Herring Gulls on the Serpentine.

January 18th, heard a Blackbird singing strongly in Kensington Palace Gardens, an early date for this performance.

January 27th, about 50 Tufted Duck are now on the Serpentine.

February 2nd, one Black-headed Gull in Hyde Park has nearly attained its dark head: two others are almost as advanced.

February 6th, a few Common Gulls and one Herring Gull on the Serpentine. Counted 59 Tufted Duck and 17 Pochards there.

February 17th, a pair of Egyptian Geese were to-day up in an Elm tree in Kensington Gardens.

February 19th, two immature Common Gulls on the Serpentine.

February 25th, over thirty Pochards on the Serpentine. Most of them left after about ten days.

March 11th, only about a dozen Tufted Duck and the same number of Pochards now left on the Serpentine.

March 16th, a hen Blackbird with an almost white tail in a shrubbery close to the Bridge. Chaffinches singing well.

March 22nd, very cold N.E. wind, about a hundred Black-headed Gulls still on the Round Pond. As a rule nearly all of them have left by this date.

March 31st, all Pochards have left the Serpentine. Saw a Great Crested Grebe in full breeding plumage on the Round Pond.

April 8th, a Willow Wren singing in Campden Hill Square. Only five Tufted Duck appear now to be left on the Serpentine, and of these three are males.

April 9th, heard a Chiffchaff singing in Kensington Gardens, and another in Hyde Park, near to the Ranger's Lodge.

April 18th, Willow Wren singing in Kensington Gardens.

April 21st, heard Willow Wren's song in the grounds of Holland House.

April 27th, Mr. R. Stonham tells me that on this day he saw a Common Sandpiper by the Long Water.

April 28th, influx of Willow Wrens into both Kensington Gardens and Hyde Park. Saw a Swallow over the Long Water, and heard Chiffchaff again by the Ranger's Lodge.

April 30th, a Reed Warbler singing in the Dell at the east end of the Serpentine.

May 4th, watched a Great Spotted Woodpecker drumming most persistently in the grounds of Holland House. Mr. R. Stonham told me that to-day he again saw a Common Sandpiper by the Long Water.

May 5th, my wife heard a Cuckoo calling from the direction of Holland House.

May 6th a Lesser Whitethroat singing in The Dell.

May 9th, a Garden Warbler sang in Kensington Gardens; saw a Sand Martin over the Long Water, and heard Chiffchaff again singing by the Ranger's Lodge in Hyde Park. [This Chiffchaff was seen and heard within a few yards of this spot on many occasions throughout the summer, up to July 24th. I saw no signs of it having a mate or a nest]. Saw from the top of an omnibus a pair of House Martins putting the finishing touches to a nest which they had built under a balcony on the third floor of Castlenau Mansions by Hammersmith Bridge.

May 11th, Blackcap singing in the grounds of Holland House. Great Spotted Woodpecker drumming hard; in the evening it continued for two hours on end. It is nearly always on the same tree.

May 18th, Whitethroat singing in Kensington Gardens by the Bridge, and a Garden Warbler singing in the grounds of Holland House.

May 14th, heard Willow Wren, Chiffchaff, Wren, Garden Warbler and Blackcap singing simultaneously at Holland House. A Whitethroat sang in the Kensington Gardens Sanctuary. I heard this bird daily till near the end of the month, when I left town for a few days. It appeared to be a solitary male.

May 15th, a Swift over the Long Water.

June 2nd, a brood of Blue Tits has hatched out in one of the nesting boxes in my garden. Saw some young Mistle Thrushes at Holland House.

June 4th, saw Spotted Flycatcher near the Ranger's Lodge.

June 11th, found Great Spotted Woodpecker's nest in grounds of Holland House, young fledged: there appear to be two or perhaps three of them, and as is usually the case, they are very noisy. This nest is a rather curious one, in the trunk of an old pear tree, just under a branch. The opening is only 4 ft. 4 in. from the ground and seems to be an old one which has had very little done to it recently.

June 17th, a Great Spotted Woodpecker visited an ash tree in front of my house: this is the only occasion upon which I have seen one in Campden Hill Square.

June 30th, Swifts have not been seen so numerous or regular in their visits to the Serpentine as in recent summers, but I saw about a dozen there this evening. There are still five Tufted Duck to be seen there, of which three are males.

July 5th, on my way to the Zoological Gardens, saw a Tufted Duck with six lately hatched ducklings on the lake in Regents Park.

July 10th, a Tufted Duck with four young a day or two old on the Serpentine.

July 17th, saw a Cuckoo in the Kensington Gardens Sanctuary being chased by a Crow. Perhaps it was the Cuckoo referred to in a letter to "The Times" which appeared yesterday in which Mr. W. D. Lang of the Natural History Museum says that he heard a Cuckoo singing in Kensington Gardens on July 14th, a remarkably late date. To-day I saw a Tufted Duck with eight ducklings in St. James's Park.

July 21st, Mr. D. Gunn tells me there are two broods of Tufted Ducks, of eight and seven respectively, in St. James's Park: and Mr. Harold Russell writes to me that there is a Tufted Duck with eight ducklings on the lake in the grounds of Buckingham Palace. This species is evidently establishing itself firmly as a London resident: a few years ago it was a somewhat scarce and irregular winter visitor.

July 28th, the last day during the summer upon which I heard a Thrush singing in London.

July 29th, numbers of Swifts in Kensington Gardens. Watched a pair of Spotted Flycatchers feeding two young birds sitting on railings close to Hyde Park Corner. Saw a Whitethroat in the Kensington Gardens Sanctuary.

July 30th, heard Willow Wren's autumn song in my garden.

August 6th, Willow Wrens singing in Kensington Gardens and Hyde Park.

August 7th, an invasion of Willow Wrens. Heard one in this Square, several in Kensington Gardens, and there were at least a dozen, mostly young birds, in Hyde Park Sanctuary.

To-day a Common Sandpiper flew across the Serpentine. This is the first I have seen here in autumn since August 24th, 1904. They occur fairly often during their spring migration.

August 8th, two Swifts over the Serpentine.

August 10th, one or two Swifts near the Surrey end of Hammer-smith Bridge: the last I saw in London.

August 14th, Willow Wrens still abundant in Hyde Park.

August 15th, Brown Owls have been very noisy of late at night on Campden Hill.

August 18th, a Whitethroat and about a dozen Willow Wrens in the Kensington Gardens Sanctuary, and a Swallow over the Serpentine.

August 25th, a Spotted Flycatcher in the Kensington Gardens Sanctuary.

August 27th, several Willow Wrens still in Hyde Park.

August 31st, a Whitethroat in the Kensington Gardens Sanctuary.

September 4th, Chiffchaff singing weakly in Hyde Park.

October 8th, the drake Gadwall is on the Round Pond, his sixth autumn there.

October 30th, Mr. Lawrence J. Tremayne writes to me that on this day both he and his wife saw several Black-headed Gulls perched on trees in St. James's Park.

November 20th, seven or eight Tufted Duck and three Pochards on

the Serpentine. Saw a Goldfinch in the Kensington Gardens Sanctuary, where a Wren has taken up its abode. Thrushes are singing now steadily.

November 24th, two Fieldfares flying over Kensington Gardens.

November 26th, ground hard with frost. Thrushes have ceased singing.

November 27th, another Fieldfare in Kensington Gardens.

November 29th, two Herring Gulls on the frozen Round Pond: a Common Gull on the ice on the Serpentine where it remained some days.

November 30th, two Redwings on lawn close to Hyde Park Corner, a favourite spot with them in hard weather.

December 7th, the Redwings by the shrubberies at Hyde Park Corner now number seven.

December 8th, saw a Kestrel flying over the Long Water.

December 10th, the Redwings at Hyde Park Corner have increased to about twenty.

December 14th, the Serpentine is almost entirely frozen. Counted fifteen Pochard and about as many Tufted Duck.

December 24th, Redwings still at Hyde Park Corner, and to-day I saw quite a dozen in St. James's Park.

December 28th, about a dozen Coot and twenty Tufted Duck on the Serpentine.

December 31st, during the warmer weather which followed Christmas, most of the Redwings left Hyde Park: very few now remain. During the gales of the last three days, the number of Tufted Duck on the Serpentine has increased to forty one.

CHANGES IN THE VEGETATION AT THE BLACK POND, ESHER

By HAROLD J. BURKILL, M.A., F.R.G.S.

THE Black Pond is formed by an embankment at its western end across the hollow where the drainage from the surrounding slopes collects into a small stream flowing westwards to join the River Mole.

Ten years ago the whole of this area between the roads from Esher to Cobham and to Oxshott was covered with fine timber, large pines occupying the central portion, with a narrow belt of mixed trees on each side along the two roads. These two marginal zones are unchanged, so there is not so much interest attaching to them, but as alterations are taking place in the nature of the flora of the central area, it may not be inappropriate to give a few details concerning the position.

The soil is mostly of a fine whitish sand, with pebble beds cropping up in the ridges to the north of the pond, and peaty conditions prevailing more to the south and west where the pines grew most thickly. Under these trees hardly any other forms of plant life grew. The soil was thickly covered by a carpet of pine needles, with a few plants of *Calluna vulgaris*, *Erica cinerea* and *E. tetralix* in places, while along the southern edge of the pond were several small pools of peaty water with bushes of *Salix repens*. The embankment where the soil is more clayey was marked by a few *Quercus pedunculata*, *Betula verrucosa*, *Salix cinerea*, *S. caprea* and *Castanea sativa*.

Phragmites communis occupied the eastern end of the pond itself and spread in a thin belt along the northern edge with denser colonies at the north-western and south-western corners. A few *Salix cinerea* bushes were to be seen at the eastern end, where also grew *Viola palustris*. *Eriophorum* was plentiful on the southern side, and *Anagallis* abundant in the north-west corner.

During the war the pines were felled by a Canadian lumber gang, only a few trees being left along the margin of the pond, and most of these were blown down in the following winter. The area now is being claimed by *Betula verrucosa* and *Molinia caerulea*. *Betula tomentosa* is to be seen more often to the east of the pond, but nowhere is it in the same profusion as the other species of Birch.

Salix repens has gradually died out, as if unable to stand the light; not a question of drought as the pools still remain, and there are a few plants still left under the trees along the Oxshott road. Yet in other places in the neighbourhood this plant grows out in the open, as on Esher West End Common, Epsom Common, and Wimbledon Common.

Anagallis tenella and *Viola palustris* seem to have vanished from the pond, but the latter occurs in localities on either side of this place. *Phragmites communis* has increased very much and has spread towards the centre of the pond, encroaching on what used to be open water, so that only a small area is now left for the bathers. *Eriophorum* also is increasing, and last summer the white plumes were to be seen in abundance all along the south side together with the yellow spikes of *Nartherium*. The increase in these plants points to a silting up of the pond. The level of the water has not been appreciably altered. For some years this overflowed by a cutting through the middle of the embankment on to the ground below, which thus became very swampy as there was no direct drainage channel. Now, however, this outflow course has been blocked up and an old culvert in the south west corner of the pond carries the water off to a channel cut across the lower ground.

Mr. R. W. Robbins has suggested that with the destruction of the pines the surface of the soil has become drier, and as it is now exposed to the wind and the rain, loose particles can be carried down the slope to the pond thus causing a silting up process, which if continued will in a few years reduce the pond to the state of a marsh.

On the higher ground to the south east on Oxshott Heath, the pines remain undisturbed, and one can there see conditions similar to those that prevailed round the Black Pond before the war, and comparisons can be made between the natural and the altered conditions. Little attempt has been made to re-afforest the cleared area. A few young pines have been planted on the ridge north of the pond, but they are not flourishing, being too much exposed to the wind. Nature has been allowed to have free scope to clothe the bare ground and she is doing it with thousands of young birches, *Molinia* and *Epilobium angustifolium*. These have taken the place of the pines since man gave them the opportunity, but on the west side of the Cobham road *Betula verrucosa* is appearing also in large numbers, and here nature has had no assistance from man. The upper part of Esher Common for years has been open heathland, covered only with a thin growth of heather and grass, as if the sandy soil were too dry to support anything else. Now large numbers of birch seedlings are colonising this area, spreading across the heather entirely self-sown.

In the same way *B. verrucosa* has appeared during the last four years on the top of Wimbledon Common, near the windmill, where the ground was badly burnt in the hot summer of 1921, and in Kingston Vale, and also on Stoke Common, Bucks. In these places it is colonising the open grassland and growing vigorously, some of the bushes on Wimbledon Common being over 8 feet high.

It is possible that there is some subtle change taking place that is exceptionally favourable to the germination and growth of *Betula*—a change that so far we have failed to observe and realise, but which is having its effect on the vegetation.

THE GREATER SPOTTED WOODPECKER

By J. ROSS.

IN the clear light of a morning in spring, nature wears bright colours, soft, subdued and restful colours. Trees and bushes show the tender green of fresh leaves, and birds, beasties and insects are busy and joyous. On such a morning the greater spotted woodpecker may not be seen, although his colouring close at hand provides sharp contrasts, but in areas where the species occurs, something is amiss if his jolly, his almost rollicking call does not run through the wood. By the unobservant and uninitiated the happy and not unmelodious variations of the chut call may not be noticed; the greater spotted may have no song, but the subtle variety of its spring calls defies memory and analysis; if the species does not sing, it drums, and thereby presents a problem for the naturalist and a perennial interest for the observer.

Attentive ears and knowledge of the likely inhabitants of a woodland may assist in identification of the greater spotted, when the call, or drumming or tapping on a tree trunk or bough is heard. Affection for the species probably directs one's rambles through its haunts, but the birds too ramble in most seasons of the year. The greater spotted's attachment to their nesting site makes a claim on one's esteem. Possibly this attachment is a phase of the territorial idea of the bird's manner of life, but in an area where suitable sites for nesting abound, the attachment to sites in my experience is much less strong, and on occasion occupied sites have been much closer than observation elsewhere would lead one to anticipate with the territorial idea in mind; this may be due to the existence in this area of numerous breeding starlings, which take or endeavour to take nesting sites that woodpeckers have excavated.

In his attitude to the greater spotted the starling in this area is not a gentleman. A woodpecker hole close to a much frequented road, with such numerous chips scattered around as to prove beyond question that it had been made that year, was occupied by starlings. In an earlier year in the same district a starling, perched on the stump of a broken bough above a greater spotted's hole, chattered and gossipped to the annoyance of the woodpecker hen, who was either finishing the inside of the hole or incubating. She put out her head several times and looked up at him, but he did not desist until the cock woodpecker arrived and drove him away. Again, in this area parent woodpeckers had been deterred from feeding their chanting youngsters by the presence of humans sitting near. When the humans moved off, both

cock and hen greater spotted arrived. The cock fed the nestlings, while the hen remained on the bole of the beech (*cf.* J. H. Owen, "B.B.," October, 1925, Vol. XIX., No. 5, p. 127.) The cock left, and the hen began to feed the young; she was still at the hole when a starling flew down and dived over her head into the nest. The consternation and distress of the hen woodpecker seemed plain, and when she flew away there was much anxious chutting. After being in the hole some time the starling looked out, and seeing the way was clear, left. Chanting was resumed, and the youngsters or youngster remained alive. A week later a well-fledged youngster lay dead at the foot of the tree; it had not been dead long, and was partly covered by some child's pathetic offering of buttercups and grasses. Undeniably the starling is not a gentleman.

Persistent drumming in January, 1918, attracted me to two partly-decayed beech trees, which already contained a series of woodpeckers' holes. The trees are so close as to appear to grow together at their bases, and each trunk has woodpecker holes. Early in 1918 part of one tree was snapped off in a gale; the species nested in this damaged tree that year, and next year another piece was fractured, but the support of branches firmly driven into the earth prevented a complete breakage and kept the partly-severed portion of the trunk in a horizontal position; this part of the trunk contained holes, including the one occupied in the previous year. The woodpeckers prepared a site in the trunk of the other tree, but that hole was clumsily cut into by some human enemy. The birds resorted to an old hole in the partly-severed horizontal part of the other trunk and there reared a brood. The hole on inspection in the following winter, when it was much mildewed, was an irregular cavity of considerable size; the shape was partly due to there being sound hard wood in the trunk; at one place excavation had been carried so far that only a quarter of an inch of wood remained.

The species used these two trees for nesting from 1917 to 1924, and the number of holes already made in 1917 suggested that the trees had then been used for several years. Both in 1923 and 1924 their nesting operations were interfered with. The rotten wood was apparently broken away by the insertion of a bar of wood or metal in the hole and the application of force. So far as I know, this site was not used in 1925, but the species seems to have nested in the area for many years; another dead beech not far away contained many holes, and was occupied by starlings until someone set it on fire and it collapsed.

Resonant drumming in the spring of 1918, directed my attention to a crab tree that proved to be another nesting site, and at that time contained several holes. A broken bough had lodged in the tree, the top of which being a dead and not thick bough, made an admirable perch for loud drumming. The birds here used the hole in which the nest was in 1918 for the next two years, and a hole begun in 1919 was not used as a nest until 1921. Youngsters were heard chanting in this tree until 1924.

It is fascinating to watch greater spotted woodpeckers at the nesting site, either when the hole is being made, or during incubation, or when the young have hatched. Both sexes engage in making the hole, in incubating and in feeding the young. The birds are very alert, and differ in temperament as to the risks they will run in following these occupations. The nesting sites I have known have not been in the depth of the wood, or if so have been near tracks passing through it. The birds therefore have been liable to interruption, especially on those days that I was able to give to observation. I have concluded that the hen does most of the work in preparing the hole, and is the more concerned in incubation, but the cock bird does a good share in feeding the young, particularly soon after hatching. It is exciting to settle down to observation at a site uncertain whether the birds will give one a show; they vary in boldness, or it may be in alertness, and the factor of necessity in carrying on at the moment comes into play. If one watches during incubation one has to allow for uncertainty as to one of the birds being on the nest when one arrives, and if so which bird; but the cock may arrive, approach the hole and utter some low call; the hen may leave and the cock enter—one has seen the change over. With some pairs the hen will take more risks than the cock, presumably from the greater intensity of the maternal feeling. Both sexes in other pairs or in other years seem exceptionally timid.

Patience is rewarded; if one has good fortune, the hen may be seen working away at the hole, trimming it from the outside, and one may watch chips falling. Is it ages of inherited practice that results in so beautifully round a hole, or is it that the bird's body is round at its broadest part? When trimming, the bird frequently passes the front part of the body into the hole as if testing its size or shape for convenient access. A noise in the wood, the snapping of a twig even, may cause a bird so engaged to cease working and listen; she may resume after a pause or may leave. I have known a bird cease working, and have later learnt that the reason was the approach of some people. I had wondered how internal excavation went on, and in the spring of 1925 at the first nesting site made in a dead hornbeam I heard tapping, no bird being visible. The tapping proceeded, with interruptions when human voices could be heard from time to time. A track passed near this site, and the undergrowth round the base of the trees was littered with chips, but none of those passing noticed them. The tapping went on for an hour, and I circled round the tree, watching from all sides as far as intervening trees or bushes would allow. I was close to the tree on the side away from the hole when the bird left and gave the greater spotted call. Does the confinement of the hole and its atmosphere cause the bird no appreciable inconvenience?

The finding of many new chips near a nesting site in autumn has induced me to think that holes sometimes may be begun at that season. I have known holes begun in the autumn, but have not known such a hole used for nesting. One hole begun in autumn in a splintered beach bole, because of the narrowness of the wood where it

was placed, appeared to be a hopeless effort; was it the work of a young bird?

The wariness of the species, particularly the cock bird, during incubation and the nesting period, makes observation sportive in many cases. Some birds when feeding nestlings carry on apparently indifferent to observation; this may be when the young are newly hatched. Other birds of the species seem absurdly reluctant to go to the hole. I well remember a cock bird alighting on a crabtree below the hole; he hopped up the trunk, passed the hole, and remained some minutes above it; he then came down backwards, passed the hole again, and flew off; he pecked the trunk or made a pretence of doing so, and may have conversed in low tones with his mate in the nest. The birds at the beeches in 1919, when they were interfered with and bred in the broken horizontal bough, were very entertaining. The cock would appear in the trees and, by a gradual approach from branch to branch, would arrive at the horizontal bough where the nest was; he would hop along the side of the bough away from the observer, his head only being visible now and again, and would get to the hole. The observer plainly was under observation. Sometimes this cock, having arrived at the nest, would go in and perform his duties, and sometimes he postponed them. The fall of other trees has left a clear space in front of these beeches, and there are several large oaks near by. When one was watching, the birds would fly across the clearing from different directions, and would go into oaks and search for food, sometimes pecking out grubs. It was necessary to be slow in using field-glasses; rapid movement of the arms alarmed the birds. At times the birds became excited at being unable to visit the nest and would call loudly in agitation, but still keep well out of sight; they were not as secret and elusive as I have found green woodpeckers to be at the nesting site. My observations have been made in woods to which the public has free access and uses it, but some parts are much more visited than others, and the habits of the birds differ according to the number of humans regularly in the neighbourhood; of that I am convinced.

The chanting of the nestlings is another of the species' attractions. All the nests I have known have been considerable distances up the trees; when the nestlings are very young, when one stands close under a hole that is high up, it is not much more than possible to hear the chanting; with other birds at a later stage the chanting can be heard distinctly at a distance of sixty yards, and attracts the notice of casual passers-by. When the hole is under observation, and the parent birds are alarmed and will not visit the nest, they will call frequently and noisily, and I think they endeavour to quieten the noisy youngster or youngsters; but once and once only have I known them succeed. This happened at a hole in an ash in a part of a wood where the species habitually uses these trees. In this case, so far as I could judge from the chanting, only one youngster remained, and it came to the mouth of the hole to inquire the reason of the absence of its

parents. It may be that it saw the observer, but for some reason it ceased chanting.

To hear the chanting of a young greater spotted become gradually louder and to see its scarlet crest appear at the hole, as the bird looks on a world as yet unfamiliar to it, is a charming experience when it is new. From the volume of chanting and the habit of the youngster or youngsters appearing at the entrance to the nest, I have concluded that successful broods are frequently small in the area I have worked. Single youngsters or one of a pair are much more likely, I think, to appear at the mouth of the hole than when the brood is more numerous.

It is at the nesting period that observation of the species is most rewarded, but at other seasons, when the trees are leafless, much may be learnt of the birds. When courting is in progress, and the birds chase each other in rapid flight, it is remarkable how difficult it is to pick them up when they have alighted, although the approximate place is known. At such a time one may hear a whinnying note when the bird is in flight; I confess I do not know how this note is caused, and I cannot recall having heard it except when the birds have been in flight, and then usually when about to alight. Again, how interesting it is to see the greater spotted attack the marble galls on oak trees. It wrenches the gall off, takes it to a favourable situation and hammers it open to get the grubs.

My observations have never been continued day after day at any period of the year, and have not scientific value from that standpoint. I am much interested in the existence of the red patch on the forehead of the youngsters and on the back of the head of the cock bird, and of the absence of such colour on the head of the hen after the first year, but I venture no explanation; it would be dangerous to do so without a fairly intimate knowledge of some American species of woodpeckers.

ARCHAEOLOGICAL INSPECTIONS

Westminster Abbey.—Visited January 17th, 1925.

WE paid a visit to some of the little-known nooks and crannies of London's mediaeval monastery, under the guidance of Mr. H. V. Molesworth Roberts. Gathering first in Dean's Yard, the company visited successively Little Dean's Yard, the quadrangle of the school; the school coal cellar, a crypt eight centuries old; the great school hall and Busby Library, by the courtesy of the headmaster; the interior and fine staircase of Ashburnham House, and the site of the refectory behind; the gymnasium of Westminster School, with site of St. Dunstan's Chapel; the ancient remains in the private houses of the Rev. Canon Donaldson, Archdeacon Charles, and Cannon Perkins, by the special kindness of these gentlemen; and other parts full of the associations of monastic days.

An interesting discussion, led by Mr. Roberts, was held on the visit on Tuesday, January 20th, at which various aspects of the Abbey and its history were discussed.

St. Martin's, Eynsford, Kent.—Visited March 28th, 1925.

Of the several notable pilgrimages to places of historical interest undertaken by us during the year, none was more productive of profit and pleasure than that to this "gracious valley of the Darent with its swift clear waters." The permanent record of our visit, which is available for members, is very complete. It is of special value, for it contains much original work descriptive of the old church (undeservedly neglected by writers in general) together with numerous beautiful photographs by Mr. V. E. Walker.

The building has an interesting plan development. To-day, it consists of chancel with apsidal east end, nave without aisles, double north transept, south transept, tower at the west end of nave, and a west porch at the west end of the tower. The shingled spire, rising from the tower, just sufficiently asserts itself in the tree-filled valley by the river.

St. Andrew's, Greenstead, near Chipping Ongar, Essex.—Visited May 16th, 1925.

We revisited this remarkable timber-built church of Essex after fourteen years, and the binding in of our new record with that of the earlier one at Mr. Austin's suggestion, shows an interesting development in our recording scheme, which has been brought about by more members co-operating now than formerly.

The plan of the church, with its nave, chancel, western tower and south porch is the outcome of building activities carried out over many centuries. An outstanding feature is the nave, which apart from its modern roof and dormer windows, is unique, and is thought to show

how Saxons built their churches in such stoneless counties as Essex. The walls are constructed of half tree trunks ranged upright side by side, the inner faces of which show, inside the nave, as adzed flat surfaces, whilst the outer faces show as the natural half round forms of the tree trunks.

The question as to the method adopted by the early builders to light such a church as this, is one of the many problems which remain for us to investigate in connection with this interesting building.

Romsey Abbey, Hants.—Visited July 10th-14th, 1925.

This successful week-end was in the able hands of Dr. Simpson. He had prepared a scholarly lecture on the history of the Abbey, and was able to impart his knowledge of the structure to members when he escorted the party over the buildings and ruins. Afterwards he led a discussion on the numerous points of interest.

The Abbey was founded early in the 10th century for Benedictine Nuns. Most of the Conventual buildings are gone, but examples of work from the 11th to 16th centuries exist in the different parts of the tower; nave with triforium and clerestory and choir, both with their aisles; both transepts; and traces of the Lady Chapel.

St. Margaret's Chipstead, Surrey.—Visited October 3rd, 1925.

Our former visit was in 1922, but a record was not made then as now. This large church stands some 500 ft. above, and a little way from the main Brighton road. It is cruciform, having north and south transepts. The nave has aisles, the tower is central and the chancel is aisle-less. There is a south porch.

In the modern aisle to the north of the nave is a rebuilt door of Norman workmanship. In other parts of the church work of the 13th and 15th centuries is to be found.

The triangular-headed windows to the chancel are probably unique, and, though of the 13th century, strongly suggest Saxon tradition.

Westminster Abbey.—Visited November 7th, 1925.

We made a second tour round unknown Westminster Abbey under the guidance of Mr. Molesworth Roberts. The Rev. Cannon Vernon Storr, M.A., kindly showed us over his house in Dean's Yard, including his hall in the cellarer's range, an upper room containing unique frescoes of Italian type between the timbering, and the remains of the misericorde in an out-building. The school dining room, originally abbot's refectory, was next visited by courtesy of the headmaster, with its original louvre in roof, dais, and musician's gallery over the "screens." The features of the four walks of the great cloister were explained, including the north walk or monastic library, and the west walk or novice's school. The party finally descended, by courtesy of the custodian and Dean's Verger, to the chapter house crypt, with hollow central pier and remains of an altar. Thanks were accorded to the authorities for facilities of access and to Mr. Molesworth Roberts for the great trouble he had taken in making our afternoon so intensely interesting.

H. SPENCER STOWELL, *Recorder.*

PAPERS READ TO THE SOCIETY

January 6th.—“Spiders,” by E. C. Ash.

February 3rd.—Annual Exhibition.

“Oak Galls of the Cynipidae,” J. Ross.

“Birds,” by Miss Best.

“Churches,” by R. Marshman Wattson.

“Moths and a Few Plants,” by J. W. Colthrup.

February 17th.—“The Birds of Lundy,” by Capt. R. W. Lloyd,
M.B.O.U.

March 3rd.—“The Zoo Aquarium,” by P. W. Horn.

March 17th.—“Architecture and Life,” by H. V. Molesworth Roberts.

April 21st.—Bacot Memorial Evening. “The Use of Photography in
Entomology: A Practical Exposition,” by H. Main, B.Sc.,
F.Z.S.

May 5th.—“A Botanical Holiday at the Lizard in June,” by E. B.
Bishop.

May 19th.—“Luminosity in Nature,” by R. W. Pethen.

September 15th.—“Early Christian and Byzantine Art,” by A. R.
Martin.

October 6th.—Exhibition of Botanical Slides, by A. W. Dennis.

October 20th.—“Birds seen during the Oxford Expedition to
Spitzbergen,” by Niall Rankin, F.Z.S., M.B.O.U.

November 3rd.—“Notes on the Palaearctic Accipitres,” by H. Kirke
Swann, F.Z.S., M.B.O.U.

December 1st.—Annual General Meeting. President’s Address.

December 15th.—“The Increase in Melanism in the last Half-
Century,” by A. W. Mera.

THE BIRDS OF THE SHETLAND ISLANDS

A Sketch

By. W. E. GLEGG. F.Z.S., M.B.O.U.

THE map of the Shetland Islands, which form the northernmost limit of the British Islands, reveals the striking irregularity of their coast-line. This feature is so markedly pronounced that no portion of these wild and rugged islands is more than four miles distant from the sea. Consequently, so exposed are they to the high winds which sweep the ocean, that the islands are almost constantly subjected to a spray of salt water. That these conditions exert a powerful influence on the type and number of the birds of these outliers of the islands of Scotland, is apparent. Shetland's vegetation is scanty indeed; although stunted bushes may be found behind sheltering walls, the islands may be described as treeless.

We can see the relation between the irregularity of the coast and the limited number of species which may be found during the nesting season. During the course of the writer's two visits of a month each in the nesting seasons of 1922 and 1923, a matter of fifty different kinds of birds were identified, a number which could be exceeded in one day in the south of England. This number does not include all the nesting birds of Shetland, but the comparison serves to illustrate that the avifauna is of a restricted and somewhat specialised type. Naturally those birds which require the shelter of bushes and trees, while rearing their young, are almost entirely absent. Well does the writer, when on his journey southwards, remember the surprising effect of a Redbreast's song, which floated to his ears, while viewing the country from the top of the tower of the noble cathedral of Kirkwall, the chief town of the Orkneys. This abundant British bird was never met with on the more northerly group of islands. Although the notes of the Blackbird may be occasionally heard, the Shetlander has little bird-song to lighten the seclusion of his life. The only bird which has a good song and is common is the Sky-Lark, which is held in much veneration by the people, the nest being considered sacred. The following traditional lines are used as a curse on anyone molesting the lark's nest :

“ My malediction stick to dee
As tar sticks to the tree
And spread ower dee
As butter spreads ower bread.”

The correlation between the character of the coast and the bird-

life can be traced a step farther, for the scarcity of birds of prey is to an extent controlled by the absence of their natural prey, the smaller birds. Only three species of this type of bird came under the notice of the writer and none of these was common. The fierce Peregrine was occasionally disturbed from the cliffs of some of the grand headlands, which here and there thrust themselves into the sea. That dashing little bird, the Merlin, the smallest hawk found in the British Isles, takes heavy toll of the Pipits and Twites which inhabit the moor on which it rears its young. The Kestrel, which makes its nest on the cliffs, is even scarcer than its congeners and is rarely seen.

Let us turn from the negative to the positive view, and we shall see that Shetland is fully compensated for its lack of perching birds, and that it possesses ornithological features which are of especial interest to the student of bird-life.

The most abundant bird is the gull. Most of the visitors make for the grey capital, Lerwick, and whether interested or not their attention will be compelled by the extraordinary number of the genus *Larus* present, for it is along the shores of this magnificent natural harbour that the gulls may be found in greatest abundance. The attraction, no doubt, is the presence of the herring-fishing fleet. Every boat entering the harbour with her load of fish, has in her wake a long string of gulls ready to pounce down on any fish which may be thrown overboard. Great white patches standing out on the dark peaty slopes are gulls, but the largest gatherings are to be found along the shore between the fishing stations. These birds are almost domesticated in the town and boldly frequent the streets, picking up refuse, regardless of the passer-by.

Six different species of gull nest among the islands, and colonies of all may be found not far from Lerwick. The remarkable little island of Noss, to the east of the town, serves as a nesting retreat for five of these. The Common and Lesser Black-backed Gulls lay their eggs openly on the grassy slopes, the Herring Gull and Kittiwake adopt the rugged cliffs, and the Great Black-backed warily retires to the inaccessible Holm of Noss. The Black-headed, nests almost within the confines of the borough, on the little Loch Clickhimin. But wherever you go in Shetland you find the gulls. The noisy Kittiwake is probably the most numerous; the numbers which may be seen amid the grand cliff scenery of the Burrafirth, on the north of Unst, are especially noteworthy.

More of this little island of Noss, for it is one of the sights of Shetland. At its western side it is only a few feet above sea-level, but at the east it terminates in a magnificent cliff with a sheer drop of six hundred feet. Gazing down from the dizzy heights of the Noup, as it is called, on the myriads of birds, in the immensity of the space flitting about like so many insects, the sight is deeply impressive. Later with the assistance of a motor-boat, a visit was made to the foot of the Noup, and it must be confessed that the natives are not unjustified in claiming that the true wonders of Noss can only be seen from below. Every ledge of this huge cliff-face was crammed with its countless tenantry of Kittiwakes and Guillemots.

All the features of this remarkable island cannot be dealt with here, but there are two species, the Great and Arctic Skuas, which, on account of their outstanding interest, must be mentioned. There is no more striking feature of the bird-life than these two predatory species. In many respects both birds are similar. During the nesting period both are gregarious, and their nests and eggs resemble those of gulls, but the nests are not placed so close together as in a gullery, in fact the space between two skuas' nests would be sufficient for a fair-sized gullery. A remarkable character, which is common to both Skuas, is the method of obtaining food at the expense of other birds, such as Gulls, Terns, etc., which, when chased by the relentless Skua, in their terror, disgorge the newly obtained food, which is then seized in mid-air by the attacker. However, the Skua can also forage for himself.

The behaviour of the Skuas at the nest is very different. The Arctic is very noisy and equally active, and he boldly attacks the intruder. The writer has been struck repeatedly by this bird, but always from behind. The Great Skua or Bonxie, as the Shetlanders call it, acts differently. It may be seen floating lazily and silently over its nest, but the presence of a human being in the vicinity galvanizes it into activity. The attack of the Bonxie is something to be remembered. The bird swoops down to the ground ahead of the intruder, turns, and flies straight at his face, gathering velocity as it comes. Instinctively the attacked, when the bird gets near, raises the hands to ward off the coming blow. The Bonxie abruptly checks his flight, at the same time thrusting out his feet, and then rises over the head of the intruder. The writer has been the subject of many such attacks but was never struck; those who have been, liken the blow to that which might be received by having a brick thrown at them.

To see the Skuas in their chief fastness we must leave Noss behind and sail in the little steamer to the island of Unst, the most northerly of the group. This island at the north terminates in the remote and exceedingly wild headland of Herma Ness. Here a hundred pairs of Great and well over two hundred pairs of Arctic Skuas nest annually. But these fine birds were not always so numerous; thirty-five years ago the Bonxie was almost extinct, and then Henry Edwardson was appointed as watcher, and to-day is still carrying out his duties. Every year on the advent of the nesting season he repairs to his hut, specially erected for him on this wild Shetland headland, far from human habitation. Edwardson claims that a particular pair of Arctic Skuas have been known to him for over thirty years, and that they place their nest in the same position every year, near the hut. Both these birds will come boldly to the door of the hut, to be fed with bread or biscuit, fish-eaters though they are. This has been witnessed by the writer.

The Great Skua is the monarch of all the Shetland birds. This is demonstrated at its two main nesting homes, Noss and Herma Ness. In both cases the physical features are similar; a confined area rises rapidly and culminates in a sharp drop. At both places the Great Skua has seized the highest ground for his nesting operations, while

the Arctic Skua occupies the zone immediately below. Even the noble Sea Eagle, which had its last British home in these islands, treated the Bonxie with respect.

There is much of interest at the wild Herma Ness, and from its summit the jagged rocks of the Muckle Flugga will be viewed with interest. This is the extreme northerly point of the British Isles, and birds innumerable flit to and fro, none perhaps more noticeable than the curious Puffin. With the aid of a telescope it will be seen that the summit of the rock is crowded with Gannets sitting on their nests. But this interesting bird is quite a newcomer, for it nested in Shetland for the first time in 1915, at the Noup of Noss, and five years later it made its nest at the north of Unst. Of the additions to the bird population the most remarkable is the Fulmar Petrel, which may be found in numbers wherever there are suitable cliffs for nesting purposes, but this bird is spreading all over Britain.

A prominent feature of the Shetland landscape are the many lochs, often occurring in chains. These series of lochs were in quite recent times, perhaps even to-day, used as a means of travelling through the islands, for, as the lochs are separated by narrow bars of land, the boats could easily be transferred from one loch to another. There can be little doubt that these lochs were at one time voes, which have been separated from the sea by sand bars driven up by the waves. The work of the bird-man in the Shetlands would be incomplete without a visit to some of these lochs. They are the haunt of many waterfowl of which that handsome saw-bill, the Red-breasted Merganser, and the Red-throated Diver or Rain-Goose, as it is called in Shetland, are perhaps the most attractive. The name of Rain-Goose is given to the Diver because its call is supposed to indicate the approach of rain. Even in the past this bird would seem to have had some hold on the imagination of the islanders, for Loch Lumbister, one of the larger sheets of water, derives its name from the Norse word for the Diver, looma. It may be that the Rain-Goose has altered its habits, but to-day the nest is almost invariably found at the side of a small tarn and not on the lochs of the size of Lumbister. Another interesting feature of the Diver's nesting habits is that a tarn rarely, if ever, shelters more than one nest.

In many cases bogs of varying size will be found between the foot of one loch and the head of another. It is in such places that we must seek one of the rarest and perhaps the most beautiful of the birds of the islands, the Red-necked Phalarope. A matter of six colonies of this species are known to the writer, but they are all small, in some cases only one or two pairs being found. Small as the Phalarope is, it may be seen at the head of the lochs buoyantly riding waves, which, surely, must engulf it. Here it is found most confiding and could be photographed without the aid of any hide. To the ornithologist, the Phalarope is of special interest, as it is one of the few species of which the female possesses the more handsome dress and the male carries out all the duties of incubation and rearing the young.

The greater part of the surface of the islands is composed of moorlands, but the islands vary somewhat. Yell possesses a much deeper bed of peat than any other, and it may be that one author, who likened the moors of Shetland to the Siberian tundras, may have had this island in view. Fetlar, on the other hand, is said to derive its name from its fertility; it would be more appropriate to say lack of barrenness. These lonely moors have their own birds. The wailing call of the Curlew soon announces trespass on his territory, and his protest may be supported by the tittering call of his less numerous cousin, the Whimbrel. The plaintive call of the Golden Plover heightens the loneliness of the heather-clad peat slopes, and many Dunlin and Snipe make their nests here.

Reviewing the main aspects of the bird-life broadly, it may be said that predatory types predominate. Apart from the two rapidly increasing Skuas, most of the gulls must be placed in this category, and the more defenceless birds have two other formidable enemies in the rapacious Raven and Hooded Crow. These scavengers do great damage among the eggs of such birds as Whimbrel, Red-throated Diver and Eider Duck, although there are still many of the last named nesting throughout the islands. The reduction of the number of Whimbrels is the most serious case as this was always a rare British bird.

This is merely an outline of the birds, for there are many which could be mentioned. On account of the high winds, which tear across the islands, very often accompanied by heavy rain, the study and photography of birds is not easy, but those who are prepared to face these difficulties will not be unrewarded by a visit to the Shetland Islands.

THE LIBRARY

The number of volumes added to the library since the issue of the printed catalogue in February, 1915, to date, appears to be 157. This total includes 91 volumes forming the Nicholson Bequest.

The additions are classified as follows:—Archaeology, 2; Biology, 11; Botany, 126; General Nat. History, 4; Ornithology, 9; and Topography, 5.

There is an addition of 74 MSS. under the following headings:—Archaeology, 82; Botany, 6; Conchology, 1; Entomology, 27; Geology, 1; Miscellaneous, 3; and Ornithology, 4.

Of Pamphlets, 48 have been added in the same period, classified as follows:—Archaeology, 5; Botany, 9; Entomology, 17; Geology, 7; Miscellaneous, 4; and Ornithology, 6.

7 Museum Guides have been added to the collection of same, while various volumes and parts of Magazines and Periodicals have been added to the library from time to time.

According to the register, the small total of 25 books and MSS. were issued in 1925, compared with 16 in 1924 and 19 in 1923.

ROBT. W. PETHEN.

REPORTS FOR THE YEAR

THE COUNCIL

IT is with some degree of satisfaction that the Council makes its annual report on the affairs of the society during the current year.

As, on the grounds of economy, the custom of previous years will be followed and no balance sheet printed, brief reference is made here to the condition of the finances. The total income for general purposes amounts to £50 6s., and our expenses to £41 9s. 5d., leaving with a sum of £17 2s. 10d. brought forward from the previous year, a credit balance of £25 19s. 5d. The Life Composition Account has risen from £20 to £25, and, although there is still a debtor balance on the "London Naturalist" Account of £17 18s. 5½d., it is less than in the previous year. This all round improvement in the finances is the result of an increasing membership and strict economy.

The membership list, in spite of the inevitable amount of attrition, has made healthy progress. We have lost, from various causes, during the year, eight members, seven branch associates and one country associate. Against these losses we have gained, twenty-one members, four branch associates, and one country associate. It will be seen from these figures, taken altogether, that there is a balance on the right side. Remembering that the average number of members admitted annually during the previous five years, was eleven, the present year's total of twenty-one is encouraging. Good as the figure is, our efforts must be continued undiminished not merely to maintain this rate of progress but even to accelerate it.

The attendances at Winchester House continue to flourish. During the past six years each year has shown an advance on its predecessor. For 1920 the average per meeting was 20, this year it has risen to the respectable figure of 38·8, an increase of 18·8. During 1920 the attendance in the aggregate amounted to 201, of which figure 11% was represented by visitors. The aggregate attendance in the present year totalled 544, visitors accounting for 28·8% of this figure. If this year's average attendance of 38·8 be considered in relation to the membership, it will be seen that it represents 29% of the names on our books. However, actually 60 members have attended at some time or other, and on effecting a similar comparison with this figure we find it equals 45·1%.

Early this year a new committee, to be known as the Ramblers' Committee, was formed with the object of providing field meetings of general interest. A successful series of these meetings has been held under the aegis of this organisation. This committee has been granted permission by the Council to develop into a section, and in future will be known as the Ramblers' Section

The programme which has been provided for the meetings at Winchester House has been well up to, if not in advance of, the usual standard. A heavy list of field meetings has again been successfully carried through. The adherents of the various sections have been well catered for in this respect, as no less than forty such meetings have been held during the course of the year. Of other activities of the society, it must be mentioned that Mrs. W. Boyd Watt acted as delegate to the Annual Congress of the South-Eastern Union of Scientific Societies; Mr. L. B. Prout represented us at the International Congress of Entomology, held at Zurich; and Messrs. Robbins and Glegg visited Bishops Stortford College to judge the exhibits at the annual natural history competition.

The Chingford Branch has held its usual series of meetings under the guidance of Mr. E. Samuelson. The Branch has suffered a severe loss by the death of Mr. A. G. Hubbard, who for five years held very worthily the position of chairman. The Council wishes to place on record an appreciation of Mr. Hubbard's valuable services and of the respect in which he was held by the members. The branch is to be congratulated on having obtained the services of the Rev. H. J. Gamble, as chairman.

After six years' service, Mr. W. E. Glegg has resigned the position of general secretary. The society has been very fortunate in securing the services of Mr. J. P. Hardiman to fill this position.

Judged by an annual comparison the progress of the society may not stand out very boldly, but if a retrospective view be taken of the past few years, it will be clear that we have not been standing still, and that there exists in our midst an atmosphere of confidence, which was at one time all too lacking in our work. The growth, which has taken place, should serve as a foundation for an accelerated rate of improvement in the future.

WILLIAM E. GLEGG, *Hon. Sec.*

NOTE

THE Council desire to place on record their high appreciation of the valuable services Mr. W. E. Glegg has rendered to the society during the six years he has held the important office of general secretary. When Mr. Glegg accepted the post of honorary secretary, the prospects of the society, after the strain and reaction of the war, were far from encouraging; but by his untiring energy and enthusiasm, his invariable tact and courtesy, obstacles have been overcome, keenness has been again evoked, and the present hopeful outlook steadily built up. Fortunately Mr. Glegg's advice and experience will still be available as a member of the Council, and for the guidance of his successor Mr. Hardiman.

S. AUSTIN, *President.*

ORNITHOLOGICAL SECTION

THE following members were elected to form the committee for 1926 :—Chairman, J. E. S. Dallas ; Secretary, S. G. Poock ; Recorder, A. Brown ; Members of Committee, S. Austin, C. S. Bayne, P. J. Hanson, and Miss H. Watkins. Mr. J. E. S. Dallas was again elected to represent the Section on the Publication Committee, and Mr. C. S. Bayne to represent it on the Publicity Committee of the Royal Society for the Protection of Birds.

The section provided the following papers for the society's syllabus, which were read at central meetings :—February 17th, "The Birds of Lundy," by Capt. L. R. W. Loyd, M.B.O.U. ; November 8rd, "Notes on the Palaearctic Accipitres," by Mr. H. Kirke Swann, F.Z.S., M.B.O.U.

SECTIONAL MEETINGS

Three sectional meetings were held, at which the following papers were read :—January 20th, "The Preparation and Storage of Birdskins," by Mr. P. W. Horn ; April 7th, "The Gannets of Grassholm," by Miss Hibbert Ware, F.L.S.

On September 1st the society's oölogical collections were exhibited. At the Chingford Branch of the society an ornithological lecture was delivered on February 9th on "Birds of the Shetland Islands," by W. E. Glegg, F.Z.S., M.B.O.U.

On January 10th, the members of the section visited the Ornithological Department of the British Museum, Mr. N. B. Kinnear, C.M.Z.S., M.B.O.U., indicating especially types in the different plumages of the British gulls.

The programme of monthly field meetings was successfully carried through, visits being made to the following districts :—Dorking, Kentish Marshes, Essex Marshes, Epping Forest, Wisley Common, Ivinghoe, Passingford, Rainham (Kent), Essex Marshes, Bricket Wood, Virginia Water, and Navestock. The average attendance at these meetings, since their inception, has been :—1920, 7·4 ; 1921, 6·8 ; 1922, 8·8 ; 1923, 11·0 ; 1924, 9·3 ; 1925, 10·16.

As an experiment, during the year of report some week-day afternoon walks were organized, Richmond Park and the northern and southern portions of Epping Forest being the localities visited. The section visited the Heronry in Wanstead Park, through the courtesy of Mr. T. F. McKenzie, superintendent of Epping Forest ; and the Brent Valley Bird Sanctuary, through the courtesy of the Selborne Society.

The committee held four meetings during the year.

RINGING AND COLLECTIONS

The section sent in 203 schedules under the "British Birds" Marking Scheme, the work being materially helped by our correspondent, Miss F. Collins. The recovery of one marked bird was reported, a Common Tern, ringed by Mr. W. E. Glegg in the

Camargue (Bouches du Rhône) on June 16th, being recovered later in the year in the Salin de Giraud in the same Department.

The photographic collection now numbers 158 sheets, 15 fresh sheets having been added during the year as follows:—4 of the Black-winged Stilt, 2 of the Kentish Plover, 1 of the Nightjar, sitting, 1 of the eggs of the Nightjar, 1 of a larder of the Redbacked Shrike, 5 of Australian birds (Coachwhip Bird, Emu, Goldfinch, Black Swan, and Satin Bower Bird), 1 of the Great Crested Grebe, and nest.

The following eggs were kindly presented by Mr. R. B. Lodge; Black Kite, Pelican, Squacco Heron, and Night Heron.

Twelve new members of the society joined the section during the year, *viz.*:—Messrs. R. S. Archbould, E. Bidwell, S. Boardman, W. C. Cocksedge, Miss F. Collins, Messrs. H. B. Fulford, C. Hart, W. A. Mancell, Cecil Norman, L. Parmenter, S. G. Poock, and Mrs. Boyd Watt. The section deeply deplores the loss, through a fatal motor-car accident, of Mr. H. B. Fulford, an active member of the section and of the Chingford Branch.

As in past years, the thanks of the section are owed to numerous correspondents who have furnished notes and records.

[Mr. J. P. Hardiman, after two years service, has resigned the position of secretary. While regretfully accepting his resignation, the section wishes to record its indebtedness to Mr. Hardiman for the valuable results achieved by him during his term of office. Mr. S. G. Poock has consented to fill the vacancy thus created].

In what follows all dates are in 1925, except where otherwise specified.

NEW SPECIES

Two species new to the society's district have been recorded making the total number 179. These new occurrences were:—*Acrocephalus palustris* (Bechstein) (MARSH-WARBLER), June 5th, 1924, seen and heard singing at the Long Water, Kensington Gardens, reported by H. G. Alexander, in "British Birds," vol. 18, p. 242. *Sterna a. albfrons* (Pallas) (LITTLE TERN), September 22nd, 3 adult and one immature birds were under observation for an hour or more (sometimes at close range) at Staines Reservoir, reported by J. P. Hardiman.

INTERESTING RECORDS

Other interesting records for the year are as follows:—*Corvus c. cornix* (Linnaeus) HOODED CROW, February 20th, on Wimbledon Common, reported by Capt. H. T. S. Stoneham (see "British Birds," vol. 18, p. 302). October 29th, seen on mud flats of the Thames at low tide, at Lonsdale Road, Barnes, reported by Miss H. Watkins. *Acanthis l. linaria* (Linnaeus) MEALY REDPOLL, March 29th, Hampstead Heath, on alders, reported by Bertram Lloyd (see "British Birds," vol. 19, p. 22). *Emberiza c. calandra* (Linnaeus), CORN BUNTING, May 4th and 10th, Staines Reservoir, reported by J. P. Hardiman and A. Holte Macpherson. *Motacilla a. alba* (Linnaeus), WHITE WAGTAIL, April 18th, at Barnes, reported by A. Holte Macpherson (see

"The Field," April 30th). *Motacilla c. cinerea* (Tunstall), GREY WAGTAIL, December 20th, 1924, near Bushey, reported by L. J. Tremayne; December 25th, 1924, Holly Hill Farm, Enfield, reported by H. Sagar; March 7th, King George Reservoir (1); October 3rd (several), 10th (1), and 24th (1), at Walthamstow Reservoirs, reported by W. E. Glegg; November 18th (1), December 5th (1), and 18th (8) at Barnes Reservoirs, reported by J. P. Hardiman and A. Holte Macpherson. *Anthus spinoletta petrosus* (Montagu), ROCK-PIPER, September 22nd, Staines Reservoir, reported by J. P. Hardiman. *Regulus r. anglorum* (Hartert), BRITISH GOLDCREST. In 1921 a pair bred successfully in a garden in Loughton, very close to the Forest, reported by C. S. Baker, per W. E. Glegg. *Saxicola r. rubetra* (Linnæus), WHINCHAT, May 10th, at Staines, reported by A. Holte Macpherson. *Micropus a. apus* (Linnæus), SWIFT, April 18th (early date) Walthamstow Reservoir, reported by W. E. Glegg. *Carine noctua mira* (Witherby), LITTLE OWL, October 24th, Walthamstow Reservoirs, reported by W. E. Glegg. *Buteo b. buteo* (Linnæus), BUZZARD, October 3rd, seen passing over Epsom Downs, reported by Howard Bentham (see "British Birds," vol. 19, p. 211). *Falco p. peregrinus* (Tunstall), PEREGRINE FALCON, October 25th, seen soaring over Epsom Downs, reported by Howard Bentham (see "British Birds," vol. 19, p. 211). *Phalacrocorax c. carbo* (Linnæus), CORMORANT, October 3rd-24th, Walthamstow Reservoirs, reported by W. E. Glegg; November 28th, Staines Reservoirs, A. Holte Macpherson. *Mareca penelope* (Linnæus), WIGEON, March 7th (20), King George Reservoir; September 12th (11), Walthamstow Reservoirs, both reported by W. E. Glegg; April 3rd (many) and May 4th (6), Staines Reservoir, December 5th (a few), Barnes Reservoir, all reported by J. P. Hardiman; May 3rd, Staines, June 18th, Barn Elms, and December 5th (2), Lonsdale Road Reservoir, all reported by A. Holte Macpherson. *Spatula clypeata* (Linnæus), SHOVELER, March 7th (6 or 7) and May 3rd, Staines Reservoir, both reported by A. H. Macpherson; November 23rd (6), Staines Reservoir, reported by Donald Gunn, per A. H. M.; April 3rd (pair) and May 4th (7), Staines Reservoirs, both reported by J. P. Hardiman; September 12th (2), Walthamstow Reservoir, reported by W. E. Glegg; October 17th (pair), Highgate Ponds, reported by Mrs. H. Boyd-Watt. *Dafila a. acuta* (Linnæus), PINTAIL, September 12th, Walthamstow Reservoirs, reported by W. E. Glegg. *Nyroca f. ferina* (Linnæus), POCHARD, observed from November 21st to December 18th in flocks, ranging from 300 to 500 and more, on Barnes Reservoir, reported by Messrs. A. H. Macpherson, Donald Gunn and J. P. Hardiman. *Nyroca m. marila* (Linnæus), SCAUP, April 4th, May 16th, June 1st, August 9th-15th (♂), Walthamstow Reservoirs, reported by W. E. Glegg and R. W. Pethen; December 3rd, 1924 (♂), Staines Reservoir, reported by J. W. Castle, per A. H. M.; January 24th (♀ or young), Barn Elms Reservoir, reported by A. Holte Macpherson; October 14th (♀ or young), Staines Reservoir, reported by Donald Gunn, per A. H. M.; December 2nd (1), Brent Reservoir, reported by J. P. Hardiman.

Nyroca fuligula (Linnæus), TUFTED DUCK, reported by A. Holte Macpherson as having bred in Kensington Gardens, Regents Park, St. James's Park, Barn Elms Reservoir, and in grounds of Buckingham Palace (per Harold Russell). *Glaucionetta c. clangula* (Linnæus), GOLDEN EYE, Staines Reservoir, December 26th, 1924 (many, chiefly ♂'s), March 7th (4 or 5), March 16th (20 or 30), March 29th, April 3rd (7), October 14th, reported by Messrs. W. E. Glegg, Donald Gunn, J. P. Hardiman, and A. H. Macpherson; Barn Elms Reservoir (♀) February 21st, reported by A. Holte Macpherson; near Watford, October 28th, reported by J. P. Hardiman; Barnes Reservoir, November 18th (1), December 5th (4 including one old ♂), 18th (2), 27th (3), reported by A. Holte Macpherson and J. P. Hardiman. *Mergus m. merganser* (Linnæus), GOOSANDER, recorded at Staines Reservoir from December 13th, 1924-March 29th (numbers varying from 1 to 5), and from November 28th-December 18th (numbers varying from 6-40, the greatest number of old males seen at one time being 7), reported by Messrs. A. Holte Macpherson, W. E. Glegg and J. P. Hardiman. Also recorded at Barnes Reservoir from November 17th-December 27th (numbers varying from 3-6, no old males among them), reported by Messrs. A. Holte Macpherson, Donald Gunn, J. P. Hardiman, and Major Dankes. *Mergellus albellus* (Linnæus), SMEW, species still increasing. Recorded at Walthamstow Reservoirs by W. E. Glegg from January 3rd-February 28th; at the Barnes Reservoirs, by Messrs. A. Holte Macpherson, J. P. Hardiman and Major Dankes, from January 31st-March 28th (greatest number at one time being 14) and from November 28th-December 27th (greatest number 48); and at Staines Reservoir by W. E. Glegg on December 26th (1924) and by A. Holte Macpherson on December 26th (1925). *Scolopax r. rusticola* (Linnæus), WOODCOCK. Holly Hill Farm, Enfield, recorded by H. Sagar on December 24th and 26th, 1924, and January 13th, and by P. J. Hanson on March 22nd. *Lymnocryptes minimus* (Brünnich), JACK SNIFE, January 8th, at Brent Reservoir, by J. P. Hardiman. *Erolia a. alpina* (Linnæus), DUNLIN, at Barnes Reservoirs on July 28th, 29th (2), August 15th and December 13th, reported by Messrs. A. Holte Macpherson, Donald Gunn, J. P. Hardiman and Major Dankes; at Staines Reservoir (2), reported by A. Holte Macpherson; and at Walthamstow Reservoirs on August 29th (7), reported by W. E. Glegg. *Tringa nebularia* (Güntherus), GREENSHANK, August 15th, at Barn Elms Reservoir, reported by A. Holte Macpherson; August 29th, at Walthamstow Reservoirs, reported by W. E. Glegg. *Tringa hypoleucos* (Linnæus), COMMON SANDPIPER, remarkably numerous in July and August. Recorded from Walthamstow, Barn Elms and Staines Reservoirs. One seen flying across the Serpentine on August 7th, by A. Holte Macpherson. *Tringa ochropus* (Linnæus), GREEN SANDPIPER, October 18th, at King George Reservoir and October 25th, near Watford, both reported by J. P. Hardiman. *Numenius p. phaeopus* (Linnæus), WHIMBREL, May 3rd, one heard at Staines Reservoir, reported by Messrs. A. Holte Macpherson and J. P. Hardiman. *Pluvialis apricarius* (Linnæus), GOLDEN PLOVER, October 25th (20),

Staines Reservoir, reported by Donald Gunn, per A. Holte Macpherson. *Charadrius h. hiaticula* (Linnæus), RINGED PLOVER, May 10th, Staines Reservoir, reported by A. Holte Macpherson. *Larus marinus* (Linnæus), GREATER BLACK-BACKED GULL, December 27th, one adult at Barnes Reservoir, reported by A. Holte Macpherson. *Larus f. fuscus* (Linnæus) LESSER BLACK-BACKED GULL, February 10th, 1924, one seen on Walthamstow Reservoirs, reported by R. W. Pethen; July 12th (1), July 22nd (3), and July 29th (12) (a wonderful group in all stages of plumage) at Barn Elms Reservoir; October 31st (6), at Barnes Reservoir; December 12th (6), at Staines Reservoir; all reported by A. Holte Macpherson. *Sterna h. hirundo* (Linnæus), COMMON TERN, March 9th, 1924 (9), Walthamstow Reservoirs, reported by Miss A. Hibbert-Ware (see "Essex Naturalist," vol. 21, p. 132); July 26th and August 23rd, Staines Reservoir, reported by A. Holte Macpherson. *Colymbus stellatus* (Pontoppidan), RED-THROATED DIVER, November 15th, 1924, Walthamstow Reservoirs, reported by W. E. Glegg. *Podiceps auritus* (Linnæus), SLAVONIAN GREBE, October 12th, November 17th, December 12th, 19th, and 26th, Staines Reservoir, reported by Messrs. A. Holte Macpherson and Donald Gunn.

PEPPING FOREST REPORT

The present report confines itself to a statement of new and interesting occurrences and is supplementary to those which appeared in the "London Naturalist" for the years 1923 and 1924.

One new species is as follows:—*Buteo b. buteo* (Linnæus), BUZZARD. One was observed on March 12th, 1924, at Gilwell Park, Sewardstone; reported by Miss A. Hibbert-Ware. On March 15th, one flew over Yardley Hill, into Bury Wood; reported by Mr. G. L. Bruce, per Miss A. Hibbert-Ware (see "Essex Naturalist," Vol. 21, p. 132).

Other interesting records are as follows:—*Fringilla montifringilla* (Linnæus), BRAMBLING. One seen in Hill Wood on January 1st, and were numerous on March 1st and 8th: none seen after March 15th; it is worth noting that these birds pass through the Forest on their return to the north; reported by S. Austin and W. E. Glegg. *Saxicola r. rubetra* (Linnæus), WHINCHAT. Mr. R. D. Hayward, per S. Austin, reported that he found on June 11th, on Fairmead, a nest containing 6 eggs, and that in due time these were all successfully hatched out. *Accipiter n. nisus* (Linnæus), SPARROW-HAWK. Mr. Stuart Boardman sends the following notes concerning a pair of this species which nested in the Forest:—

"In 1923 they built their nest about 40 feet up in a silver birch and reared three young; in 1924 they again used a silver birch (some 50 yards distant from the previous nesting-tree) and reared four young. This year I was unable to find the nest until after the young had flown; it was this time built in an oak tree some 50 yards distant from the two previous nesting trees. At the foot of the oak I found a broken Sparrowhawk's egg.

"In the centre of the triangle made by these three nesting-trees is

a log used as a slaughter-log; to this most of the hawk's victims are brought, where they are plucked before being taken to the nest. Thus in the breeding season the log and ground around are strewn with plucked feathers, wings, claws, etc.; on one occasion, in 1924, on the log alone there were some 1,800 freshly plucked feathers.

"From feathers picked up and carefully identified (for help in which work I am indebted to Mr. W. P. Horn) I have ascertained that this pair of Sparrowhawks have this season fed upon the following species of birds:—Blackbird, Meadow Pipit, Chaffinch, Missel Thrush, Great Tit, Redstart, Greenfinch, Starling, Hawfinch, Song Thrush, House Sparrow, Tawny Owl, Jay, Woodpigeon, Lesser Spotted Woodpecker, and Whitethroat, and I think it also probable that the Green Woodpecker and Little Owl may be added to this list.

"At a little distance from the slaughter-log mentioned, there is a decayed log containing ground beetles (*Abax striola*), and one may sometimes find upon it some half-dozen wing-cases of these beetles, which are also to be found in the hawks' pellets. Besides the usual feathers, claws, mouse fur, and tails, legs of beetles, etc., I have this year found in one pellet the remains, apparently, of a starling's egg.

"Possibly the most interesting incident I have witnessed in connection with this pair of birds was an attack upon a squirrel, which took place last year. I saw the hawk swoop down upon a brown squirrel (which was but a few feet away from me), and as it touched its intended victim, the squirrel gave a faint but shrill squeal. Being very unwilling to see the loss of a squirrel from the Forest, I immediately clapped my hands and was thus successful in frightening away the hawk and saving the squirrel's life."

Nyroca fuligula (Linnæus), TUFTED DUCK, April 5th, 2 ♂ and 2 ♀ on Highams Park Lake, reported by W. E. Glegg. In November, one on the "Green Man" Pond, very tame, coming to be fed with the swans; reported by Miss G. Lister per S. Austin. *Ardea c. cinerea* (Linnæus), HERON. Mr. J. P. Hardiman reported that he counted 46 nests at Wanstead Park on May 10th. *Scolopax r. rusticola* (Linnæus) WOODCOCK, November 11th, 1924, at Black Bushes, reported by Keeper Stubbs, per P. D. Hayward and S. Austin; October 18th, 1925, below Loughton Camp, reported by R. S. Archbould; in December near Connaught Water, reported by H. C. Playne, per S. Austin. *Capella g. gallinago* (Linnæus), COMMON SNIPE, April 26th, at north end of Forest, reported by J. P. Hardiman; November 12th, opposite "Wake Arms," reported by R. S. Archbould. *Tringa hypoleucos* (Linnæus), COMMON SANDPIPER, May 10th, in Wanstead Park, reported by J. P. Hardiman. *Vanellus vanellus* (Linnæus), LAPWING, Mr. J. Ross reported that he saw two at Long Running on April 14th, 1923. Mr. P. J. Hanson reported seeing one at Yardley Hill, on April 19th. *Podiceps r. ruficollis* (Pallas), LITTLE GREBE. In November, five were seen on the Eagle Pond; they appeared to be parents and chicks, reported by Miss G. Lister, per S. Austin. *Columba ænas* (Linnæus) STOCK-DOVE, April 26th, at north end of Forest, and May 10th, at Wanstead Park, both reported by J. P. Hardiman.

W. E. GLEGG, Chairman.

PLANT-GALLS SECTION

○ NE paper was read at the sectional meeting held on June 9th, when "Mites and their Galls" were discussed. Six expeditions were undertaken, the districts visited being—Bookham Common on May 24th; Epping Forest, June 14th; Esher, July 25th; Mickleham Downs and Box Hill, August 29th; Limpsfield, September 26th; and Claygate, October 31st.

The number of galls recorded on these outings amounted to 162, and included *Viola Riviniana*, Reichb., *f. villosa*, Neum., Wahlst., and Murb., galled by *Perrisia affinis*, Kieff., and by the fungus *Urocystis violae*, Sow.; *Vicia hirsuta*, Gray, galled by *Contarinia cracca*, Kieff.; *Peucedanum sativum*, Benth. and Hook, fil. leaflets folded upwards, the folds being occupied by yellow *Cecidomyid* larvae; *Ballota nigra*, Linn., galled by *Perrisia* sp.; *Salix repens*, Linn., galled by *Oligotrophus capreae*, Winn., and by *O. capreae*, Winn., var. *major*, Kieff.; *Populus tremula*, Linn., galled by *Harmandia globuli*, Rubs.; and *Betula tomentosa*, Reith. and Abel, galled by enlarged buds, apparently Dr. Houard's No. 6451.

Messrs. Bishop and R. W. Robbins paid critical attention to the species of *Rosa* met with and the galls of *Rhodites*, with the result that *Rhodites rosae*, Linn., was noted on *R. tomentosa*, Sm., *R. Eglanteria*, Huds., and *R. canina*, Linn., *Rh. eglanteriae*, Hartig, on *R. tomentosa*, *R. Eglanteria*, *R. canina*, *R. micrantha*, Sm., *R. dumetorum*, Thuill., and *Rh. rosarum*, Giraud, on *R. canina*, and *R. dumetorum*.

Individual observation resulted in a large number of notes, of which the more interesting perhaps were—*Eriophyes* curling the leaves of *Achillea Ptarmica*, Linn.; *Tylenchus devastatrix*, Kuhn., in the root-stock of *Pedicularis sylvatica*, Linn.; *Contarinia lonicæarum*, F. Low, and *C. riburni*, Kieff., on *Viburnum Lantana*, Linn.; *Trioza urticae*, Linn., on *Urtica dioica*, Linn.; *Eriophyes psilaspis*, Nal., on *Taxus baccata*, Linn., var. *adpressa*; *E. triradiatus*, Nal., on *Salix vitellina*, Linn., var. *pendula*; *E. geranii*, Can., on *Geranium lucidum*, Linn.; *Contarinia tiliarum*, Kieff., on *Tilia cordata*, Mill.; *Clinodiplosi thalictricola*, Rubs., on *Thalictrum flavum*, Linn.; *Tylenchus devastatrix*, Kuhn., on stunted shoots of grass, probably *Anthoxanthum odoratum*, Linn.; *Asphondylia ulicis*, Verrall., on *Ulex Gallii*, Planch.; *Eriophyes* sp. (Houard, No. 1981 ?) on *Acer Pseudo-platanus*, Linn.; *Phyllocoptes anthobius*, Nal., on *Galium saxatile*, Linn.; *Rhodites spinosissimæ*, Giraud, on *Rosa spinosissima*, Linn. (in London), *Andricus nudus*, Alder, on *Quercus pedunculata*, Ehrh. Also on *Q. pedunculata* margins of the leaves turned downwards into small crescentic folds each covering a deep yellow larva of a midge, not *Macrodiptosis dryobia*, F. Low. Possibly Houard's No. 1806a.

Spathegastes aprilinus, Giraud, was very abundant on the oaks in the early summer, and it was possible to carry out experiments which resulted in establishing the connection between these flies and the galls of *Neuroterus ostreus*, Giraud, details of which are published in "The Entomologist" for September. *Andricus testaceipes*, Hartig, seemed to

be more in evidence than usual, while on November 2nd, *N. lenticularis*, Oliv., was noted to be very abundant in Kew Gardens on *Quercus pedunculata* and also on other kinds of oak, though *Spathogaster baccarum*, Linn., had been scarce in the spring.

A feature of the year was the almost entire absence of the *Galium* galls, and also of *Perrisia urticae*, Perris.

H. J. BURKILL, *Hon. Sec. and Recorder.*

ARCHAEOLOGICAL SECTION

THREE sectional meetings were held during the year mainly devoted to the discussion of records. They were not well attended and it has been decided, with a view to making these meetings more popular, in future to include in the announcements of such meetings an "attractive item" as well as records.

Five Saturday excursions were held, *viz.*, Eynsford, Greenstead and Chipstead, of which records have been prepared, and two to Westminster Abbey. The week-end was to Romsey.

The membership is practically unaltered (increase of 1), but the attendances have, in some cases, been decidedly thin, for example, only 7 members attended the Chipstead meeting. In this connection it is to be hoped that the notice cards sent out with regard to the excursions may be more productive of attendance in future. Quite a large proportion of members have not been to any excursion at all.

A notable feature of this year's activities is that all the lectures, papers, etc., besides of course the work on the records, have been provided by members of the section. Mr. Molesworth Roberts gave an illustrated lecture on "Architecture and Life," led two visits to Westminster Abbey and opened the discussion on the Abbey at one of the sectional meetings. Mr. Martin gave an illustrated lecture on "Early Christian and Byzantine Art." Dr. Simpson was the leader at Romsey and read a paper on the Abbey, besides describing the building as he took us over it, and Mr. Wattson provided the ten minutes illustrated lecture at the annual exhibition.

The annual dinner, at the Comedy Restaurant, was the most successful and best attended the section has held, 33 members and friends being present. The guests of the evening were Mr. and Mrs. Glegg, and several members of other sections, notably the ornithological, attended.

W. C. FORSTER, *Secretary.*

RAMBLER'S SECTION

EARLY in 1925 a ramblers' committee was formed consisting of 5 members who organised rambles of varying character throughout the year. The movement met with such success that the committee was recognised as a "section" by the Council at the close of the year. It now numbers 19 members.

The rambles are held on the third Sunday in each month. They are of an informal character and take into account no one special branch of the society's activities, but keep in touch with all of them. Archaeology, botany, entomology, plant galls, and ornithology all have their turn, besides others such as pond life, conchology, etc., as occasions arise, and it is seldom that a ramble is held without at least one devotee of each of these studies accompanying it.

The arrangements for each ramble are in the hands absolutely of the leader of the day, so that an attractive diversity is maintained. So far, all rambles have started at a convenient hour, comfortable to all, from whatever quarter of London they may come, and it is probable that this feature will be maintained and become traditional. No special records are made officially, but many very useful notes have been obtained by individual ramblers. The section does not seek to attract members already active in other sections, but chiefly those who have a general (as distinct from particularized) interest in the study of natural history; at the same time it welcomes any specialists who care to come on its rambles, as so many points of enquirers can be elucidated by them on the spot as they arise.

Eleven rambles were held during 1925 at which the average attendance was a little over nine, the lowest being six, and the highest fourteen. They were all voted very enjoyable as well as profitable, and the section therefore desires to commend itself to those who are not attached to any section at present, and asks them to consider whether it would not be to their advantage and profit to join this organization. The section is represented on the Federation of Rambling Clubs, and on The Commons and Footpaths Preservation Society.

Four new members have already been attracted to the society through this section's agency, and it is hoped that it will be the means of introducing others. The programme for the forthcoming session is both varied and attractive. Visitors are always welcome; full details of each ramble being obtainable shortly beforehand on application to the secretary, Mr. L. J. Tremayne, Avenue House, Northumberland Avenue, W.C.2.

A. B. HORNBLLOWER, *Chairman*.

ENTOMOLOGICAL SECTION

THE successful formation of an entomological section to absorb the old lepidoptera section proved that there are several members interested in the different orders of insects, and there are signs of increased activity in the near future. Some members, however, who are reputed to be lepidopterists, have been more conspicuous by their absence than by their presence at the meetings, and we should be pleased if they could attend from time to time and so help on the work of the section.

The most important event of the year was the arrival of a collection of insects, chiefly lepidoptera and hymenoptera, bred by the late Mr.

Dowsett, and presented to the society by his son, Mr. F. A. Dowsett. Mr. R. W. Robbins has kindly undertaken the work of listing this collection, the insects of which are all in splendid condition.

On April 21st Mr. H. Main lectured to the society on "The Use of Photography in Entomology," and on December 15th Mr. A. W. Mera discussed "The Increase in Melanism in the Last Half Century." On February 17th Mr. Colthrup showed photographic slides of moths taken in their natural surroundings, while on November 17th Mr. R. W. Robbins dealt with "The Fritillaries" at a sectional meeting.

Mr. L. B. Prout represented the society at the Third International Congress of Entomology at Zurich, and furnished an interesting report of the proceedings there.

Among the more interesting exhibits at meetings have been the following :—

February 17th, *Corynetes caeruleus*, De G. (Coleop., Cleridae). The two specimens exhibited were found on a wooden pillar in Navestock church, Essex. The strange habitat for this reputedly necrophagous beetle is probably to be accounted for by the presence of *Xestobium* in the pillar, which was certainly none too sound. N. A. Kemner has recorded the larvae of *C. caeruleus* as living in the galleries of *Anobium striatum* in Sweden, (*Ent. Tidskr.*, XXXIV., p. 198, Stockholm, 1918.) J. C. Robbins.

March 3rd, *Grapta c-album*. A short series bred from pupae taken in a hop field in Herefordshire. Both types of underside were represented. *Epinephele hyperanthus* ab. *caeca*, Fuchs., Oxted, Surrey. *P. jurtina* (*janiia*). A ♀ with the brown coloration wholly replaced by pinkish-fawn, the orange blotches being unaltered. Taken at Salcombe, S. Devon, by C. L. Collenette. R. W. Robbins.

September 15th, *Lampyrus noctiluca* (Glow Worm). Four larvae from a batch of eleven sent by Mr. Hugh Main, who had obtained them from a female taken in June in the south of France. Two queens of the common garden ant (*Lasius niger*) and two batches of eggs. R. W. Pethen.

October 6th. A short bred series of *Ennomos fuscantaria*. The ♀ was taken at Limsfield on October 15th, 1924, and the first egg hatched May 28th. The brood contained larvae of two types, green and light brown, the former being more numerous. The colour difference was most noticeable in the last instar. The larvae, sleeved on ash, had all pupated by August 8th, and the moths emerged from 18th to 31st of that month. R. W. Robbins.

Cocoons of *Acronyeta aceris*, L. (Lep. Noctuae), containing pupa cases of the moth and empty puparia of the parasite *Compsilura concinnata*, Mg. (Dipt., Tachinidae.) Also the bred adults of the latter. The *Acronyeta* larvae were taken at South Kensington, August, 1924, and pupated in a few days. The *Compsilura* larvae doubtless fed up in the moth pupae during the winter, emerging in the spring to pupate inside the cocoons of the host. The flies emerged during the first half of June. Although *C. concinnata* has been recorded as a parasite of a large number of lepidoptera and several *Tenthredinidae*, it

is only able to pass the winter in a very small proportion of the species which may be regarded as primary hosts. In the case under consideration there would appear to be one or possibly two summer generations in a secondary host (which may, perhaps, be *Orygia antiqua*, L.). *O. concinnata* is of interest as being the most important of the parasites which have been introduced into the United States to combat the gipsy moth (*Porthetria dispar*, L.) and the brown-tail moth (*Nygmia phaeorrhoea*, Don.). It has spread widely and has been recorded from a number of native hosts, and produces three generations a year. A full account of the fly, by J. J. Culver, has been published by the U.S. Department of Agriculture. (Bulletin, No. 766, Washington, 1919). J. C. Robbins.

October 20th, *Meconema thalassinum*, De G. (Orthoptera, Locustidae). The female exhibited was taken on the trunk of a pine (*Pinus sylvestris*, L.) at Limpsfield Chart, Surrey, about 7 p.m. on October 17th. A short distance away another was seen ovipositing in a pine trunk about 5 feet from the ground. W. J. Lucas does not record pine as a food plant in his account of this species (*British Orthoptera*, pp. 189-193, London, Ray Society, 1920). R. W. & J. C. Robbins.

November 3rd, *Epirrita* (*Oporabia*) *dilutaria* and *E. autumnaria*. Series from S.E. Surrey. There was considerable variety in depth of colour, the lightest being among the *E. autumnaria*, which in general were also distinguished by larger size and different shape due to the more prolonged forewings. R. W. Robbins.

Six field meetings were held in the neighbourhood of London, but the weather was mostly unfavourable, and only a few captures were made. On August 29th, *Anaitis efformata* was found in considerable numbers, and good series were secured. Ichneumon flies were numerous in the early part of the summer, and these probably took their toll of the lepidoptera, as only a very small proportion of the large hordes of larvae of *Aglais urticae* that were observed in June seem to have reached maturity.

H. J. BURKILL, Hon. Secretary.

BOTANICAL SECTION.

DURING the year the section was responsible for two lectures at ordinary meetings, viz. :—"A Botanical Holiday at the Lizard in June," by Mr. E. B. Bishop, and an "Exhibition of Botanical Lantern-slides," by Mr. A. W. Dennis. The two sectional meetings were occupied by discussions on the order Boraginaceae and members' summer work.

One field meeting was held within the society's district, on May 9th, Arbrog Common and the commons towards the Black Pond, Esher, being visited. The season being a late one, not much was seen of special interest, but the cotton grass (*Eriophorum*) was noted in flower, a state in which it is not always readily identified.

Members of the section also joined the plant galls excursion to

Leatherhead and Box Hill on August 29th. The invasion of a hill-side lately cleared of trees by plants of cultivated land, including *Ajuga Chamaepitys*, Schreb., was well observed near Headley Lane.

For the northern portion of the district 4 new species have been added to the records, including *Eleocharis multicanlis*, Sm., and *Carex helodes*, Link, both detected in Epping Forest. For the southern portion 14 new forms have been added. These include *Viola canina*, L. \times *Riviniana*, Reichb. (*London Nat.*, 1924, p. 16.), *Rosa spinosissima*, L., *Rosa tomentella*, Léman, *Anthriscus cerefolium*, Hoffm., and *Setaria viridis*, Beauv.

The recorder—Mr. E. B. Bishop—will still be glad to receive lists of plants observed in all parts of the district. The exact locality, sub-district, and date of observation should always be stated.

The publication of the 11th edition of the London Catalogue of British Plants is an event of importance to systematic botany, and the revision of certain genera, *e.g.*, *Rosa*, *Hieracium* and *Euphrasia* therein, will provide work for our recorders for some time to come. The society's collections and records are compiled in accordance with ed. X, but new species and segregates can be interpolated as required, and the records will be gradually brought into line.

At the annual meeting of the section, held on December 1st, Mr. H. Spooner was elected chairman, and Mr. L. J. Tremayne, secretary, with a committee of three members.

R. W. ROBBINS, *Chairman*.

CHINGFORD BRANCH

WHILST the numbers of the branch associates has been well maintained, the attendances still leave something to be wished, though there have been signs of improvement during the July-December session. The highest attendance was 46 and the lowest 7. This last was, however, accounted for by the inclemency of the weather.

The branch have to deplore the loss by death, after a long and painful illness, of their chairman Mr. Hubbard. His place has been taken—very fortunately—by the Rev. H. J. Gamble, M.A., an old and valued member of the society, and we look forward to increased activity in every way in 1926.

The following lectures were delivered during the year: "Birds of the Shetland Islands," by W. E. Glegg, F.Z.S., "Notes on the Vertebrates," by E. Samuelson, "The Trees of Epping Forest," by R. W. Robbins, "Some English Mediaeval Monasteries," by R. Marshmann-Wattson, "Our Woodland," by J. Ross, "British Land and Fresh-water Shells," by Mrs. Hillier, "Animals and Plants of the North Eastern States of North America," by Miss Hibbert-Ware, F.L.S., "Notes on the Cromer Coast," by Rev. H. J. Gamble, M.A., "The Geology of the London Basin and the Isle of Wight," by C. O. Harvey, B.Sc.

An enjoyable visit was made to the Zoo Aquarium in July. This will be repeated at a convenient date, probably annually.

E. SAMUELSON, *Secretary*.

LIST OF MEMBERS

It is particularly requested that Members will inform the Secretary as soon as possible of any change of address

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NOTE.—The following abbreviations are used in the above lists:—*Api.*, Apiculture; *Arch.*, Archaeology; *Ast.*, Astronomy; *Biol.*, Biology; *Bot.*, Botany; *Chem.*, Chemistry; *Col.*, Coleoptera; *Conch.*, Conchology; *Dipt.*, Diptera; *Ent.*, Entomology; *Ethn.*, Ethnology; *Geol.*, Geology; *Hem.*, Hemiptera; *Hym.*, Hymenoptera; *Ich.*, Ichthyology; *Lep.*, Lepidoptera; *Mam.*, Mammalogy; *Micr.*, Microscopy; *Neur.*, Neuroptera; *Orn.*, Ornithology; *Orth.*, Orthoptera; *Ool.*, Oology; *R.*, Ramblers Section; *Rep.*, Reptilia; *Zoo.*, Zoology. * Signifies a Life Member.

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YOUNG GREATER BLACK-BACKED GULL
Isles of Scilly
Annet Island. June 16th, 1926.
Photograph by Miss C. Longfield

12 MAR 1927
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THE LONDON NATURALIST



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FOR THE YEAR
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INSECT VISION

By I. HENRY BURKILL, M.A., F.L.S.

Abstract of a Paper read to the Society on April 20th, 1926

THE reader began by rapidly tracing the manner in which it became known to the western world that plants possess sex, and that pollination leads to seed-production. The Assyrians had been in the habit of carrying the male flowers of the date to the female palm, and the Greeks and Romans knew that this was so; but the story to Parkinson in London in 1640 appeared foolishness. However, not a generation later Bobart shewed how *Lychnis dioica* might be fertilised: and Millington hazarded that the stamens are male organs. Grew quoted Millington in 1682: and Camerarius proved him right as regards *Mercurialis annua* in 1688. Ray in 1690 recalled the story of the date-palm without rebutting it. Burckhardt in 1702, Moreland in 1708, Geoffroi in 1711, Vaillant in 1717, A. de Jussieu in 1721 and Bradley in 1724 admitted sex. Gleditsch in 1749 procured pollen from a male *Chamaerops* palm in Leipzig and caused a female palm in Berlin to fruit for the first time. Sex in plants thus passed beyond dispute, and made so deep an impression that Linnaeus founded his sexual system of classification in 1753, without great opposition. The large part which insects play in securing the fertility of flowers could no longer escape attention. Phillip Miller had asserted it in 1761. Then Christian Conrad Sprengel in 1787, assigned to insects the pollination of flowers as a mission for which they had been created: he saw in the brightness of the corollas signals to attract them, and in the honey their reward, and in the shape of the corollas wonderful devices to ensure success.

Sprengel lived too early. His ideas were beyond the thought of his contemporaries, who could not envisage a service so universal as that which he claimed for insects, nor admit the possession of anything so like intention in plants as the display of purposeful attractiveness. He had one contemporary who might have understood him, Andrew Thomas Knight; but circumstances held them apart. Of the then leaders of Botany, Schleiden was almost abusive towards Sprengel: and A. P. de Candolle in 1832 with greater tolerance stated his conviction that fertilisation by insects might be an incident, but was not a function. Of Knight it may be said that the paper in which he asserted the all-importance of sexual intercourse in plants was in 1841 not considered worthy of being reprinted with his other contributions to science. Darwin in 1862 unearthed it, and focussed a fresh interest upon the cross-pollination of flowers by his postulate that Nature abhors perpetual self-fertilisation. Critics after this began to ask if insects see as we see.

The human eye sorts the light rays : vibrations round about 700μ in length we appreciate and call red : vibrations round about 620μ orange, 580μ yellow, 530μ green, 470μ blue, 420μ violet : and there are vibrations of less length of which we are aware but not by sight and call ultra-violet. The human skin is penetrated by all these, and is especially acted on by the larger ; but it cannot pass to the brain any information as to their nature. A chameleon's skin is more sensitive to them, reacting by changes in its cells : and as Grabers showed, the common Cockroach re-acts through its nervous system to blue and red even when blinded, appreciating a difference between them felt through the skin. Ants, as Lubbock shewed, appreciate ultra-violet, and Forel found that this is through the eyes. On the other hand the human eye may be colour-blind in different degrees, passing to the brain a perception of brightness without a perception of colour, or it may have only an imperfect perception : and the normal eye is unable when it receives at the same spot mixed rays to sort them aright, taking a mixture of yellow and blue for green, and red and blue for grey. Warned by our own imperfections, caution as to what the extremely unlike eye of an insect sees, should be natural to us.

Insects' eyes are of two kinds, ocelli and compound eyes with mosaic vision. Ocelli seem rather to be of the nature of lenses which signal inwards. The mosaic vision of the compound eye is that by which objects are recognised. But how much more ineffectually than human vision is guessed when we compare the number of nerve-endings, and recollect that the eye of an insect faces an enormously greater part of its surroundings. The vision indeed must be hazy except at minute distances ; and it can be calculated that a hive-bee is probably unable to realise that a pansy flower is bilaterally symmetrical at a greater distance than four inches, or to see the hive's outline at a greater distance than a few yards. Instead, as it homes, the destination appears a patchwork, the patches gradually and in a way kaleidoscopically growing less indefinite. To a feeding bee a flower as the source of food, is an area to be touched by the feet, and known commonly by experience as an object with a definite relationship in diameter to the span of its legs. A bee, changing its flower, like a man upon an irregular stairway, is thrown into hesitation in the finding of the foothold, and avoids change with a fixed instinct. From this comes its habit of reiteration, seeking clover-flower after clover-flower if that is the flower of the day, or whatever other flower it may be : and the connection of foothold with its work suggests that possibly its vision is at best at a distance not much greater than the distance from eye to feet. But this is a speculation. Yet it may be calculated that an object $\frac{1}{10}$ inch across is to it a point at $3\frac{1}{2}$ inches, one $\frac{1}{2}$ inch across a point at 16 inches, and one 1 inch across a point at 3 feet.

The maiden flight of a hive-bee is an orienting flight. The insect emerges from the hive and flies around near it. Later it grows bolder and goes farther afield, joining the gatherers who take boldly the bee-way in the air outwards when seeking food, and entering the bee-way again after feeding or in fright at a storm. It may be assumed that it

homes partly by a gathering knowledge of its neighbourhood, and partly by the herding instinct in it which suggests movement as other bees are moving. Early death is very likely; and probably often by losing the way. Lundie found that though his bees spent more time in the hive than outside it, 98 per cent of those lost died outside, and their average of journeys was but sixteen.

Continental bee-keepers paint the fronts of their hives in distinguishing colours under the idea that they so aid the insects to return. Their procedure is empirical.

Now it is not impossible that there is an undetected difference between the insect's receptivity of colour-stimuli when actively seeking food and when, after feeding, seeking rest, or one may say relative darkness: and this possibility should not be forgotten.

Lubbock in 1875 demonstrated that the hive-bee and a wasp have colour-vision, for he could train them to feed on papers of certain colours: and Forel in 1878 demonstrated the same for a bumble-bee and a wasp. But the latter complicated his experiments by varying the size of the paper, and he used over-large pieces, getting a result really undeserved,—that colour had a greater appeal to his bumble-bee than shape. In 1882 Hermann Mueller arguing that paper is no natural object, took the coloured parts of flowers and placing them between glass slips, by a number of patient comparisons shewed that the hive-bee distinguishes all the primary colours and a certain number of the shades within them. But,—most important,—he shewed that one insect would exhibit one preference, another another, and insects would change their preferences, that is to say, their mental association of a certain colour with feeding.

The Peckhams' experiment with homing wasps was very instructive. Placing coloured papers about the entrance to the nest, so that approach was through a hole in them, they obtained clear evidence of colour-vision. Bethe in 1896 experimented with homing hive-bees. He covered the hive with branches and disguised the immediate neighbourhood; he even cut down a plane tree close by, and he claimed that these changes did not hinder the approach of the homing bees: but if his account be read carefully, it appears that they did hinder them considerably. He experimented also by rotating the hive, and when it had passed through 45° the insects were lost. He did not take the view that the direction might be determined at a distance whereat these changes were immaterial, nor that one bee's movements direct those of another.

Quite recently von Frisch has described better experiments. He constructed a five-chambered hive, and trained his bees to seek food in the chamber masked with blue by the side of which was one masked with yellow. By moving the paper masks he could send the trained bees astray.

A still better experiment has been described by Kuhn and Pohl, who trained hive bees to feed on a white table at honey illuminated by one of the lines of the spectrum of mercury, the others being cut out. When the other lines were no longer cut out, the bees still went to the

line upon which they had been trained. Shut out from this, they sought the nearest visible.

Some twenty years ago Plateau assailed the idea that colours attract insects to flowers, and gathered a most miscellaneous array of observations, not adequately statistical, to prove his view. Von Hess followed him with an assertion made in 1918 and repeated in 1918 that insects are totally colour-blind. Neither of these two made good his position. To the latter von Frisch replied with an ingenious experiment made by the use of a chess-board in various shades of grey, with one or two coloured squares in it, arguing that if colour-blind the insects would see the blue or whatever it was, as a shade of grey, and confuse it: but this they did not do. Knoll subsequently used the same board to ascertain if the fly *Bombilins fuliginosus* when feeding from *Muscari* flowers would pick out a similar blue, and it did. But von Frisch found when testing bees that they confused scarlet with a dark grey, as if such true reds were beyond their colour vision.

Knoll's work with the moth *Macroglossa stellatarum* has yet more interest than anything which had been published earlier. In autumn when the moths were seeking to hibernate, he was able to prove that they appreciate size, settling by preference upon black circles sufficiently wide to be regarded as holes to admit their bodies: and they chose circles in preference to other geometric figures of similar dimensions. In this state of seeking darkness scarlet was to them as black; blue was brighter, and yellow brighter (less desired) still.

Von Frisch had tried to train bees onto geometric figures, and had failed: but his pieces of paper were far too large, so that the insects at close range would lose the margins in haziness. But he had success in training bees onto colour in concentric rings; and Knoll in a similar way found that circles were the more attractive when given a sharply contrasting border. Von Frisch trained bees to visit a circle with the right half blue and the left yellow; but when the area was divided into quadrants the results were indifferent, and when it was divided into octants they failed. He also used figures like gigantic flowers, which may be regarded as unduly large.

Surely shape is seen by insects at near distances, and probably best seen when it is neither much larger nor very much smaller than the insect itself. Insects have need of such vision to find ways through leafage, those that nest for their nests, and all for their mates. Hermann Mueller stated that the more conspicuous the flower, the better visited; but he did not examine into the relationship of the size of the flower and the size of the insect. He also called attention to the way in which certain lepidoptera congregate upon flowers of their own colour. Is not this connected with the colour vision by which they see their mates?

LONDON BIRDS

By A. HOLTE MACPHERSON

SUMMARY OF NOTES IN 1926

○ **N** JANUARY 5th, sixty-five Tufted Duck were on the Serpentine.
JANUARY 6th, saw a Black-headed Gull perched on a young Weeping Willow tree on the Island in the Serpentine. In the autumn this tree became a regular resort of this species.

JANUARY 9th, a Herring Gull, a Common Gull, ten Coots and fourteen Pochard on the Serpentine; and five of the last species on the Round Pond.

JANUARY 13th, saw a Fieldfare and two Redwings in Hyde Park.

JANUARY 14th, three Fieldfares flew over Kensington Gardens. Saw about a dozen Redwings near Hyde Park Corner. Thermometer 26° F. at 8 a.m.

JANUARY 18th, saw two Goldfinches in the Kensington Gardens Sanctuary. Three or four Skylarks were walking about on the frozen Serpentine.

JANUARY 21st, counted ten Pochard and no less than eighty-nine Tufted Duck on the Serpentine.

JANUARY 26th, saw a Great Crested Grebe, flying from the E., alight on the Serpentine at its widest point.

JANUARY 28th, Tufted Duck on the Serpentine have become fewer, but there are eighteen Pochard and a few Herring Gulls.

February 3rd, the Pochard have increased to twenty, of which fifteen are old males.

FEBRUARY 8th, heard a Chaffinch in song near Hyde Park Corner.

FEBRUARY 12th, a Blackbird singing by Lady Holland's Walk.

March 22nd, Several Redwings in Kensington Gardens.

MARCH 29th, saw a flock of from forty to fifty Meadow Pipits on the open ground near the Long Water.

April 7th, a Linnet flew over the Hyde Park Sanctuary.

APRIL 8th, heard a Willow Wren singing in Hyde Park.

APRIL 18th, Willow Wrens in song in Kensington Gardens and in the grounds of Holland House. Saw newly hatched ducklings on the Serpentine.

APRIL 14th, saw a Swallow flying over the Round Pond.

APRIL 18th, heard a Cuckoo calling from the grounds of Holland House very soon after daybreak.

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APRIL 21st, two pairs of Tufted Duck still frequent the Serpentine.

APRIL 22nd, heard a Sedge Warbler singing strongly in the Kensington Gardens Sanctuary.

APRIL 28th, a Reed Warbler singing in the Kensington Gardens Sanctuary and half a dozen Swallows flying over the Island in the Serpentine.

MAY 9th, heard a Sedge Warbler and a Garden Warbler both singing near the Long Water. Eight Tufted Duck have mysteriously appeared on the Round Pond. Heard the Cuckoo, Stock Dove, and Blackcap in the grounds of Holland House.

MAY 10th, my wife heard a Cuckoo calling from the direction of Holland House. We heard it again on various occasions during the next few days.

MAY 12th, a Swift over the Long Water.

MAY 18th, heard a Wood Wren singing in Kensington Gardens.

MAY 31st, watched two Whitethroats in the Kensington Gardens Sanctuary.

JUNE 1st, a pair of Spotted Flycatchers are in their old haunts near the band stand in Hyde Park. A Canada Gander and an Egyptian Goose, which have paired, swimming about with four young.

JUNE 10th, counted seven Tufted Duck, four of them drakes, on the Serpentine. Another pair of Spotted Flycatchers are near the Kensington Gardens Tea House.

JUNE 12th, Swifts have not frequented the Serpentine regularly this summer, but to-day about a dozen were flying over it.

JUNE 14th, saw and heard a Stock Dove near the Long Water.

JUNE 16th, heard a Cuckoo in Kensington Gardens repeat its call ninety-one times without a break.

JUNE 17th, saw a Great Crested Grebe on the Long Water.

JUNE 25th, heard Blackcap and Stock Dove in the grounds of Holland House.

JUNE 26th, two Swifts flew and screamed over Campden Hill Square.

JULY 5th, saw a Tufted Duck with a newly hatched brood in St. James's Park.

JULY 8th, a Tufted Duck with one duckling on the Serpentine (Mr. C. A. Cresswell tells me this duckling must have been the survivor of a brood of three which he had seen a day or two earlier). Saw a Common Sandpiper by the Long Water.

JULY 18th, saw two Spotted Flycatchers on the edge of the birds' bath in the Hyde Park Sanctuary, and there were some young birds in the trees close by. Possibly they were a family party from the neighbourhood of the band stand.

JULY 15th, saw three broods of Tufted Duck in St. James's Park; they numbered 6, 7, and 10 respectively.

JULY 17th, watched a pair of Dabchicks trying to build a nest on

the water in Regent's Park. Two Coots pulled it to pieces as fast as they built it. The late Mr. Harold Russell told me he saw a Tufted Duck with five young about this date on the lake in the grounds of Buckingham Palace.

JULY 19th, several Swifts over the Long Water, and a Stock Dove calling from an elm close by.

JULY 24th, Mr. C. A. Cresswell writes that to-day he saw a Common Sandpiper in St. James's Park.

JULY 26th, a Blackbird singing in Kensington Gardens. This was the last time I heard the song in 1926.

JULY 29th, a stuffy morning after a night of heavy rain. Thrushes which had nearly left off singing are in good voice again. To-day a Garden Warbler was singing in Kensington Gardens, a late date for this song.

AUGUST 12th, a sign of autumn in the return of a dozen Tufted Duck to the Serpentine. For the last fortnight many Willow Wrens have been singing in London.

AUGUST 16th, at dusk my wife and I were in our garden when a Whimbrel passed overhead at some height calling loudly several times. It was clear from the sound that the bird, which was invisible, was flying westward.

AUGUST 19th, a very large number of Mallard ducklings are on the Serpentine. Many of them are even now only a few days old and comparatively few were hatched before the third week in June.

AUGUST 20th, heard and watched a Whitethroat warbling very softly near the Peter Pan Statue in Kensington Gardens. The Gadwall drake is again on the Round Pond.

AUGUST 25th, saw ten Sand Martins fly across the Serpentine towards the S.W.

AUGUST 27th, Mr. L. Parmenter writes that he saw two Common Sandpipers by the Long Water on this date and that he had also seen one there on August 20th. Hitherto the visits of this species to Central London have mostly been in the Spring: but the number of Common Sandpipers to be seen by the various reservoirs in the London area during this July and August was so great that it is not surprising that several of them should have visited our Parks.

AUGUST 30th, heard a Chiff Chaff singing in the Kensington Gardens Sanctuary.

OCTOBER 8th, returned from my holiday to hear the Chiff Chaff again singing at the same spot.

OCTOBER 30th, saw a Grey Wagtail and a Pied Wagtail running about together on the south bank of the Serpentine.

NOVEMBER 2nd, a party of four Dabchicks on the Serpentine.

NOVEMBER 4th, the Gadwall drake has left the Round Pond and is on the Long Water.

NOVEMBER 14th, a Kestrel flew over Campden Hill.

NOVEMBER 16th, saw two Goldfinches in the Kensington Gardens Sanctuary.

NOVEMBER 18th, heard a Mistle Thrush singing well in Kensington Gardens.

NOVEMBER 22nd, a flock of Greenfinches has been frequenting the Kensington Gardens Sanctuary lately.

NOVEMBER 14th, saw a Dabchick on the Serpentine.

December 1st, again watched a Dabchick on the Serpentine, where there were at least ten Common Gulls and two Herring Gulls. Several Redwings on the lawns near Hyde Park Corner.

DECEMBER 5th, ten Pochard on the Round Pond.

DECEMBER 8th, a Redcrested Cardinal, escaped or released from captivity, was in the Kensington Gardens Sanctuary and looking rather miserable. It must be four months since it was first seen in this neighbourhood.

DECEMBER 9th, about fifteen Pochard on the Round Pond and a dozen on the Serpentine.

DECEMBER 23rd, the Gadwall drake has spent most of his seventh autumn in London on the Long Water and has apparently established himself there for the Winter. Hitherto his autumns and winters have been spent almost entirely by the west shore of the Round Pond.

DECEMBER 24th, counted eighty-one Tufted Duck on the Serpentine.

DECEMBER 28th, hundreds of Blackheaded Gulls standing on the frozen Long Water; among them, two Herring Gulls and several Common Gulls. The last named species was until recently rarely seen in London, but during the last few years it has become a regular winter visitor in steadily increasing numbers.

A RARE SAWFLY

SUPPLEMENTARY NOTE (MAY 29TH, 1927)

Two female *P. spiraeae* emerged by May 11th, 1927, from larvae that went into the earth early in September, 1926, and a third emerged a few days later. One of these sawflies, confined with a leaf of *Aruncus* in a lamp chimney, laid 90 eggs, of which 36 were on the dorsal sides of the leaflets. Larvae, the oldest of which were about half-grown, were found on *Aruncus* in the garden on May 28th.

A RARE SAWFLY

Notes on the Life-History and Distribution of *Pteronidea spiraeae*, Zaddach (Hymenoptera, Tenthredinidae)

By J. C. ROBBINS, F.E.S.

THIS paper owes much to the kindness of the late Rev. F. D. Morice, who read a draft of it in 1925, made several suggestions, and generously gave me data from his own observations. I am also much indebted to Mr. L. Nell, Dr. E. Enslin, Mr. K. L. Henriksen and Dr. F. Maidl, all of whom gave me valuable assistance, and to Mr. W. G. Sheldon, who first interested me in *Pteronidea spiraeae* at Limpsfield.

Larvae of this sawfly were first found on *Aruncus sylvester*, Kostel. (*Spiraea Aruncus*, L.) near Munich in 1876 by Kriechbaumer (2); in subsequent years he was unable to find more than a few larvae, but obtained some on *Aruncus* on the banks of the Isar near Munich and some near Rosenheim (also in South Bavaria). Some imagines bred from the larvae found in 1876 were described as *Nematus spiraeae* by Zaddach (1); the larvae were described by Kriechbaumer. The species was placed in the genus *Pteronus* by Konow (3); subsequently S. A. Rohwer showed* that the name *Pteronus*, Jurine, belonged to an entirely different genus of sawflies and proposed the name *Pteronidea* for *Pteronus* as defined by Konow, so that the name of the *Aruncus* sawfly became *Pteronidea spiraeae*, Zadd. In 1899 larvae of *P. spiraeae* were found on cultivated *Aruncus* at Oosterbeek, near Arnhem, in Holland, and several notes and a full account of its life-history, with a good coloured plate, were published by van Rossum (4), who bred the species extensively. Konow (5) gave Austria, without more precise locality, as a country in which *P. spiraeae* was known; Dr. Maidl has kindly informed me that there is in the Vienna Museum a single female *P. spiraeae*, determined by Konow, taken by Mann in 1869 at Raibl, in the Julian Alps; Raibl is now in Italy, but was formerly in the Austrian province of Carinthia, and I think that there can be no doubt but that this specimen was the basis for Konow's record. In 1910 Loisele (6) found larvae on *Aruncus* in his garden at Lisieux (Calvados), France, and bred females of *P. spiraeae* from them. Nielsen and Henriksen (7) record *P. spiraeae* from near Assens (Isle of Fyn), Denmark. In 1924 the Rev. F. D. Morice exhibited specimens of *P. spiraeae* at the Entomological Society of London (8), having

* U.S. Dept. Agr. Bur. Ent., Tech. Ser. no. 20, p. 98, Washington, 1911.

received them from correspondents in Hertfordshire; he subsequently found it himself at Woking (Surrey) and saw specimens from Lyndhurst (Hants.), and ascertained that, although never previously recorded as an English species, it has been known to exist in gardens in Hampshire, Hertfordshire and Surrey for at least twenty years. How much longer it may have been present in this country it is impossible to say, but it seems probable that it may have been introduced via Holland, with plants of *Aruncus*.

The distribution of *Aruncus sylvester* as an indigenous plant* is in marked contrast to the known distribution of *Pteronidea spiraeae*, which, except in Bavaria, has not yet been found on wild *Aruncus*, although it is probably attached to wild plants also at Raibl. *Aruncus* is found commonly in woods through Central and Eastern Europe, except along the Mediterranean, in the mountainous parts of Germany and eastern France, in the Pyrenees, in North Italy and Switzerland, Central and Southern Russia, Siberia, Asia Minor, Caucasus, Persia, Himalayas, North China, Korea, Japan, Sakhalin, Kuriles, Kamtchatka and North America. Mr. Morice found that *P. spiraeae* will neither oviposit nor feed on the meadow sweet (*Ulmia palustris*, Moench = *Spiraea Ulmaria*, L.), a fairly closely allied British plant.

On July 16th, 1925, I discovered some young (first instar) larvae of *Pteronidea spiraeae* on *Aruncus* in a garden at Limpsfield (Surrey); by July 27th nearly all had gone into the ground for pupation. On August 20th I found that, in a jar in which two full-fed larvae had been placed with earth and *Aruncus* leaves on July 28th, two female *P. spiraeae* had emerged and laid a number of eggs, one being already dead; on the same day I saw eggs on *Aruncus* in the open. On August 24th eggs hatched both indoors and in the open; the larvae that hatched indoors all died, but some from the garden were reared indoors. By September 22nd all the larvae indoors had gone into the earth, and by 26th all in the open had done so.

Two cocoons opened on December 19th, 1925, and one opened on March 21st, 1926, contained contracted but healthy larvae (pre-pupae), from which it is evident that this sawfly, like most others, passes the winter in the larval stage in the cocoon, the hibernating larva pupating shortly before the emergence of the adults in the spring.

From the cocoons made by the larvae that went into the ground in September, four adults emerged in May, 1926, on the 1st, 9th, 13th, and 14th, all being females. The first of these laid 17 eggs on the day that it emerged, and was then killed; the second laid 105 eggs in two days; the third and fourth together had laid about 70 eggs by May 16th, when one was dead and the other was killed.

I do not think that these sawflies, although kept indoors (in a cold room), emerged abnormally early, but I saw no sign of *P. spiraeae* in the garden until July, when there were a few larvae on the *Aruncus*;

* C. F. Nyman, *Conspectus Florae Europaeae*, p. 215; also suppl. ii, p. 105; Oerebro (Sweden), 1878 and 1889; Y. Kudo, *J. Coll. Agr. Hokkaido Imp. Univ.*, xi, p. 110; Sapporo, 1922.

this was, however, probably because the colony, never a strong one, had been almost or entirely exterminated, and Mr. Morice's experience shows that, at least in some years, sawflies emerging in May produce a first generation in June, so that larvae found in July would be those of the second generation.* In November, 1925, he wrote to me as follows:—"My impression is that even in England the *Aruncus* sawfly must have more than two broods normally in a year. At any rate I am sure that this is the case when the species is bred indoors. This year I found on an *Aruncus* in my garden (planted last year and only just showing above ground) a ♀ on May 19th. I placed her alive in a glass tumbler with leaves of the plant and before she died (on May 28rd) she laid eggs which in about a month (on June 20th-22nd) produced about a dozen ♀♀. These again laid eggs—of course parthenogenetically—and from these came larvae, some of which were quite small and others nearly full-fed, when I left for Switzerland on June 16th. I returned on August 16th and found in the above-mentioned tumbler a few living larvae still feeding, but no imagines. Two of the latter, however, appeared on September 10th, and one laid eggs, but I think these came to nothing." It appears, therefore, that under normal conditions there are three generations in England, as recorded by van Rossum in Holland, and further data given me by Mr. Morice indicate that a fourth or partial fourth generation sometimes occurs, at least under artificial conditions. The generations, however, overlap to some extent, owing to the varying length of the larval period, and it is possible that some hibernating larvae do not produce imagines until June or July.

Considering my own data in conjunction with those of van Rossum for the years 1899-1901, it appears that the duration of the various stages, both in England and in Holland, varies considerably according to the season. The eggs are usually laid very soon after emergence, and hatch in from 7 to 14 days. The feeding period of the larvae ranges from about 12 days in warm weather to 30 in cooler weather. In hot weather van Rossum had imagines emerge only 5 days after the larvae had made their cocoons, but probably the period spent in the cocoons by the insects of the spring and summer generations is more often 14 to 18 days. In Holland the period spent by the larva and pupa in the cocoons during the winter appears to be about 6 months, while in England, where the food-plant does not come up in the open before the end of April or beginning of May, the usual period seems to be 7-8 months.

The number of eggs laid by *P. spiraeae* varies considerably, but there is little variation in the manner in which they are laid. In August, 1925, two females in captivity laid, between them, 190 eggs; in May, 1926, one female laid 105 eggs in two days; other eggs were seen in the open. They were laid rather irregularly, but mainly in groups, almost entirely on the ventral (lower) surface of the leaves (in 1926 a

* See also supplementary note p. 10.

single egg was seen on the dorsal surface, see note p. 10). When laid the eggs are whitish and opaque, measuring about 0.75 by 0.25mm.; just before hatching they are about 0.8-0.9mm. long by 0.4-0.5mm. broad, cylindrical, rounded at each end and slightly contracted in the middle, shining and translucent, and in some the embryo is plainly visible. The leaves on which eggs were laid in captivity became rather dry, and in one case none hatched, while in another about half hatched, but no larvae were reared. Possibly the sensitiveness of the eggs to dryness and their dependence on water-vapour to supply the moisture that is necessary for their growth account for their being laid on the ventral surfaces of the leaves; for it is on this surface that most of the stomata are situated, so that the humidity is likely to remain fairly constant, owing to the transpiration of water-vapour, which is most active on hot, dry days. The eggs of *P. spiraeae*, being laid on the leaf surface, cannot derive any moisture from the plant juices, as can eggs laid in the leaf or stem tissue, such as those of *Diprion* (*Pteronus*, *Lophyrus*) *simile*, Hartig, in the needles of *Pinus strobus*.*

The larvae of *Pteronidea spiraeae* feed generally on the undersides of the leaves of *Aruncus*, eating irregular holes between the principal veins, and sometimes defoliating the plants. When only two or three days old they are gregarious, and usually hold the hinder part of the abdomen in the air, but later they become more solitary, and the curling of the abdomen is far less pronounced. They have 14 pro-legs, of which the last pair, the anal claspers, is almost absent, six pairs only being fully developed; the body is cylindrical and tapers somewhat towards the tail. I was unable to determine the number of instars, but the larvae moult at least twice before spinning their cocoons.

Description (about 3 days old): length about 4mm., body greenish-white, wrinkled, very slightly hairy, with a green stripe down the back, broken at the eleventh and twelfth segments, and terminating in a darker colour; thoracic legs whitish, with the claws and basal segments (coxae) brown, pro-legs greenish-white; head rather large, dark brown above and at sides, pale in front, slightly pilose: (about 8 days old): length 7-8mm.; body bright yellowish-green, with a dark green median dorsal stripe from the second segment to the tenth; head pale brown with two dark marks between the eyes and the vertex, mouth-parts darker: (about 11 days old): colouring similar, head less disproportionately large.

The cocoons of my specimens were made in the earth and were brownish-black, slightly shining, containing fragments of peat or sand. They are ovoid, about 8.9mm. long by 3.4mm. broad. According to van Rossum the cocoons are at first greenish; Kriechbaumer recorded that his larvae made cocoons in dead leaves of *Aruncus* and pieces of paper.

The female only of the imago is known; Kriechbaumer stated that he bred both males and females, but the male has never been found

* F. D. Morice, *Trans. Ent. Soc. London*, 1925, Proc., pp. xxix-xxxi.

since, and Mr. Morice believed, for good reasons, that the original record was due to an error.

Description: head and thorax black, except the mouth-parts, pronotum, cenchri and tegulae, which are yellowish; antennae 9-jointed, black, tapering, about as long as or slightly longer than the abdomen; abdomen pale yellowish below, the ground colour almost obscured on the dorsum by transverse black stripes; apex of saw-sheath black; legs yellowish, the tarsi of the second and third pairs and the distal portion of the tibiae of the third pair brown; wings hyaline, stigma dusky brown (this is very unusual in the genus *Pteronidea*), costa paler brown. The antennae, head, thorax, tarsi, saw-sheath and tip of abdomen are finely pilose. Length 6mm., abdomen about 4mm.; expanse of wings 15-16mm.; length of antennae 4mm. (The measurements given by different authors vary somewhat; mine agree fairly closely with Zaddach's.)

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BRITISH WILLOWS

By JOHN FRASER, F.L.S.

Read to the Botanical Section on November 16th, 1926

THE genus *Salix* is the principal one of the Order *Salicaceæ*, which also contains the Poplars, with about twenty to twenty-five good species. At a recent computation the Willows number 160-170 good species, with a large number of hybrids, which make the genus a complicated one for beginners. Enthusiastic students of the genus have raised a large number of minor forms to the rank of species, with the result that I have counted 620 species recorded in the "Index Kewensis" after excluding those which I know to be hybrids. These are distributed over Europe, Asia, and North America with a few in the tropics of both worlds, some in North Africa, one in South Africa, and one in South America, extending as far as Chile.

The British species of Willow number eighteen, which are also native to Europe and Asia, and some in North America, as if they had originated in the temperate and frigid regions of the northern hemisphere. This is substantiated by the fossil *Populus primavera* leaf discovered long ago in the Middle Cretaceous of Greenland, and another leaf, supposed to be a Willow from a corresponding horizon in the Rocky Mountains. In more recent times *Salix polaris* has been found in the forest beds of Cromer, so that Britain has lost at least one native Willow.

Every one of the eighteen British species is supposed to be capable of hybridising with every other, and that would give 144 hybrids, but only 57 binary and eleven ternary hybrids have been found in Britain and described. When one recalls that Willows are dioecious, and that they are entomophilous plants, it will be easy to see how they lend themselves to crossing. Of the 57 hybrids a large proportion are found on the mountains of Scotland, where some of them are endemic, not being found anywhere else. Some are found in the Highland valleys and the north of England and they often extend up the mountains to considerable elevations. The ternary hybrids arise through hybrids being crossed with a third parent. I have collected all the lowland species and hybrids in Surrey, with the exception of the three hybrids, *S. hippophaefolia*, *S. cuspidata*, and *S. stipularis*, so that anyone, who sets about collecting Willows, is sure to meet with some of the hybrids. The species are easy to determine, and after some familiarity with their characters, it gradually becomes more easy to determine the hybrids or supposed hybrids.

I have travelled 20,000 miles, at a low estimate, in collecting the British Willows, by train, motor bus, motor car, and on foot. The journeys were undertaken ostensibly to collect Willows, but incidentally I collected everything else I desired to have, whether lowland or upland. The systematic collection of Willows was due to a mistake I made during the first day I was in the Highlands. On the way to Ben Lawers I picked up what I considered to be *S. lanata*, but doubted the determination before the day was over. When I got home I read that I had been in the metropolis of the British Willows, and next year commenced going to the Highlands twice a year to collect flowers and mature leaves, continuing the journeys for eight years. *S. lanata* was the last species to be discovered, and in the meantime all the British species, many of the hybrids and varieties had been secured.

My system of procedure in collecting is to mark every tree or bush from which catkins or leaves are collected, in order to be certain of finding it again; because if leaves are collected from one tree or bush, and catkins from another, a great deal of unnecessary confusion may be caused. In autumn when a confused mass of bushes is in full foliage the aspect of the surroundings is so different, and memory so short that it is desirable to make a record in a notebook of the exact situation of the marked bush. In this way I have ear-marked 638 trees or bushes, for future collection or observation. From these I have selected and mounted about 400 sheets.

Unless they are growing in proximity, it is necessary to make four journeys to collect the catkins and leaves of the two sexes of one species. Many of the old time collectors were satisfied to collect only one specimen at whatever stage it happened to be, so that these are very imperfect for herbarium purposes or for study. Even the great Linnæus was sometimes guilty of this defect. Another great mistake of the old time collectors was to make one set of leaves do duty for male and female catkins on the same sheet. By this method the leaves and catkins of two varieties or hybrids got mixed. It is excellent practice for a beginner to retain a twig for dissection, when he or she gets home from an excursion. Notes should be made in a book of the number of stamens, the character of the nectaries and their number, the shape of the ovaries, whether glabrous, silky or tomentose, and whether sessile or stalked and the relative length of the stalk to the nectary. If a number is put to each Willow, with a record of its habitat, and the date of collecting, any particular Willow can be localised and referred to for any purpose in future, whether the collector has been able to determine it offhand or not. In due course it is sure to be recognised.

The drying of Willows is easy compared with many other plants. The catkins are the more easy. If the papers are changed three times at intervals of twenty-four hours, they will be dry practically, though they should be left under gentle pressure for a fortnight for the twigs to dry out. The leaves may require changing for five to seven days—much depends on the nature of the weather; but after that the heavy weight should be removed and replaced by a light one for another week

to keep the leaves flat till they stiffen. The narrow leaved species like *S. purpurea* and *S. repens* should not be freely exposed to the air from the time they are cut till put under pressure, because they are liable to roll up or become crumpled, and cannot well be flattened afterwards. Besides their untidy appearance, the margins of such leaves get hidden, and the presence or absence of serratures and their nature are obscured. It has been my custom for many years to carry a large book or album for the purpose of collecting, and this keeps the leaves flat from the first. The leaves are then easy to regulate when putting them between sheets of paper, prior to placing a weight over them. Some of them have to be turned over so as to show both surfaces after they are mounted. The opposite and decussate leaves of Mints are much more troublesome to regulate, and this must be done before they are put under pressure, otherwise they get folded longitudinally and transversely till they are almost beyond recognition, for they are more intricate than Willows in varieties and hybrids.

It is desirable that Willows should keep their green colour when dried, but there are several which turn black or deep brown naturally. They include *S. Andersoniana* (*S. nigricans*) and its hybrids, *S. purpurea* and its hybrids, and some of the forms of *S. repens*. The first specimens of *S. Andersoniana* I collected in the Highlands turned black before I got to Edinburgh, and I concluded they had been fermented and rendered useless, but subsequent collections behaved in a similar way. This character of blackening has its compensations, for it is a valuable aid in determining the numerous hybrids which it makes with other species. Many of those I collected proved subsequently to be *S. Andersoniana* × *phylicifolia*. So it is with the hybrids of *S. purpurea*, all of which blacken in drying. I collected some of them as late as October, and the mature leaves kept fairly green when dried.

The time of flowering ranges from February in the south of England to the middle of July in Scotland, upon the mountains. Latitude and elevation both have a retarding effect upon the development of the catkins. I was unable to get a single catkin of *S. Andersoniana* on a Mid-Perth mountain by the middle of June, whereas a plant of the same Willow reared from a twig at Kew, bloomed annually between April 25th and May 10th. A sunny aspect will cause them to bloom earlier than one facing the north. In clay soils covered with water the flowering period is unduly late even in Surrey. The nature of the winter has also a marked effect upon the Willows. In 1924 and 1925 it was early enough to commence collecting at the end of March. In 1926 *S. caprea*, *S. cinerea* and the hybrid *S. rubra*, as well as the exotic *S. daphnoides* and *S. pruinosa* were ready for collecting by the last week of February. All this has a considerable bearing upon the time when the collector should commence operations. The males soon shed their pollen and brook little delay; the female catkins last much longer in good condition. When one knows the nature of the soil and the species that grow in certain districts, the time for making a visit can be regulated, if allowance is made for the earliness or lateness of the season. *Salix pentandra* is the latest of the

lowland species to bloom in May and the fruit will even be worth collecting in September, in the north of Scotland.

Old time writers used to state that Willows do not give rise to seedlings, but this must have been due to lack of observation. I have collected seedlings of ten species in the wild state and have seen seedlings of *S. lanata* in addition, but thought it too great sacrilege to uproot so rare a species, hoping that some of them might prove to be hybrids. Plants of *S. Andersoniana* in the garden gave rise to seedlings that bloomed during the second and third year. I have collected seedlings of *S. alba* in two localities in North-West Surrey, where the two sexes occur; but have seen none of *S. fragilis*. That is easily explainable. I have seen only four male trees in Surrey and fear that the last of them has been destroyed by the building of houses and bungalows. The seeds of Willows germinate very quickly under suitable conditions and make some inches of growth during the year of their production. I sowed some seed of *S. repens* in a small greenhouse attached to the laboratory at Kew, and the seedlings appeared above the soil in forty-eight hours. Seeds and seedlings are so small that they must have bare ground and a sufficiency of moisture to germinate at once, or they will perish. They will germinate even on bags of concrete used to build up the banks of rivers. Other places to look for them are recently cleared ditches, railway banks, gravel on the margins of rivers, sand and gravel pits, and the upper reaches of mountains, where the soil is often bare or crumbling.

The cultivation of Willows has its uses and interest in a garden, apart from the making of baskets and other wickerwork, and the cultivation of the bat Willow. About the beginning of this century I found myself giving a different name, each time I passed it, to an old tree that had been cut down to a short stump, which was throwing up branches again. A small twig of it planted in the garden puzzled me for some years till it reached the height of eight feet, when it bloomed and the first catkin showed that it was *S. viridis* or *S. alba* \times *fragilis*. A seedling of *S. alba* planted in the garden got inconveniently tall and was lopped at a height of six feet; it then made branches six to eight feet long in a season. Though a silky-leaved species it will produce glabrous leaves for a year or two when cuttings are planted, or old bushes are stoolled. The silky-leaved *S. viminalis* and the hybrid, *S. acuminata* behave much in the same way when stoolled or when collected in hedges where they get cut down periodically. Collectors sometimes think they have found something new, but cultivation will soon dispel that notion. One must learn to distinguish between the normal and the abnormal. Many of them are as handsome, or more so for their catkins in spring, than some of the new introductions from China and other far countries. This is strongly impressed upon me when trying to get male catkins, fully expanded, of any male Willow near London, or other centres of large populations. The narrow leaved species make a good substitute for Bamboos. *S. alba vitellina* and *S. alba britzensis* are often cultivated by the margins of ornamental water for the beauty of their yellow and orange red bark respectively in

winter. *S. alba vitellina pendula* makes as handsome a weeping tree as the Babylonian Willow, with the addition that its long slender branches are golden in winter. When the trees are allowed to grow in a natural way, the hoary leaves of *S. alba*, and the silvery under-surface of those of *S. fragilis*, when turned up by the wind, maké handsome and striking objects in the landscape. Far too often these trees are pollarded and fail to show their natural beauty.

CLASSIFICATION.

British Willows are sometimes classified into three tribes, namely, Pleiandræ, Synandræ and Diandræ, but as the last make a large group, including two that have one characteristic different from all the other sixteen, I prefer to make eleven smaller groups of them instead of a synopsis to simplify their determination. The first thing to do is to examine any Willow carefully and then find out the group to which the characters conform.

I. Pleiandræ. Stamens 5, 3 or 2, free; bracts uniformly pale yellow. Catkins on long, leafy peduncles; capsule glabrous.

The above includes *Salix pentandra*, *S. triandra*, *S. alba*, *S. fragilis* and their hybrids. The group could be detected by the pale yellow bracts of the catkins alone. The male catkins fall with their leafy peduncles attached. The bracts of the female catkins fall away soon after flowering.

* Bracts blackened or discoloured at their tips form all the remaining groups except the last; Stamens 2.

II. Pruinosæ. Twigs covered with a glaucous, waxy bloom. Catkins and capsules sessile.

This group includes *S. daphnoides* and *S. pruinosa*. Both are exotics, but are introduced here, because of considerable beauty and interest, and often planted.

III. Synandræ. Stamens two, connate, or only partly so in hybrids; anthers four-celled when connate, reddish-purple.

The group includes *S. purpurea* and its hybrids.

IV. Viminalis. Stamens free, or partly connate in hybrids. Catkins subsessile. Styles long. Leaves silky-tomentose beneath.

This includes *S. viminalis*, *S. lapponum*, their varieties and hybrids.

V. Capræ. Catkins before the leaves, subsessile. Ovaries with long pedicels. Styles short or none.

This includes the three very common species, *S. aurita*, *S. caprea*, and *S. cinerea* with their varieties and hybrids.

VI. Argentæ. Small, creeping shrubs. Leaves small, with silky adpressed pubescence beneath. Styles short or medium.

The group includes *S. repens*, and numerous minor forms at one time regarded as species, then reduced to varieties and now regarded as mere forms. The so-called species described by Linnaeus, Smith, and Wulfen, may still be found and determined, but they are so variable that their determination might be left over till a good acquaintance with the larger and less difficult Willows has been made.

VII. *Phylicifoliæ*. Characters of the *Caprææ*, but styles long and stigmas deeply bifid.

The group includes *S. Andersoniana*, *S. phylicifolia*, and their numerous hybrids. They inhabit the valleys between mountains in the Highlands, and both of them with their hybrids may ascend the mountains, especially *S. Andersoniana* and the hybrids between the two. The two species are closely allied, bloom at the same time, and where they meet on the banks of rivers and streams, bees and other insects cross and mix them up in every conceivable way. There are far more individuals of the hybrid, *S. Andersoniana* \times *phylicifolia* than there are bushes of the true species.

VIII. *Arbusculæ*. Small, trailing or erect alpine shrubs, with small leaves, glabrous, except when quite young. Styles short or moderate, stigmas small, bifid. Ovary densely tomentose.

Includes *S. arbuscula* with its hybrids, and a few unimportant varieties. They are easily separated from *S. repens* and its forms by the glabrous leaves.

IX. *Lanatæ*. Leaves woolly, with long hairs when young. Catkins large, densely covered with pale yellow, silky hairs. Ovary glabrous, style long.

Includes *S. lanata* and its hybrids. A rare Willow in Britain, confined to Mid-Perth, Forfar and S. Aberdeen. Very different from every other British Willow, and easy to recognise. The hybrids are more difficult.

X. *Nitidulæ*. Leaves small, green and glossy on both sides. Stamens with pale purple filaments and purple-red anthers. Ovaries pubescent, style long.

An alpine group including *S. myrsinites*, a few unimportant forms, and several hybrids. The glabrous and glossy leaves of this species give a gloss to those of its hybrids, and thus one of the parents is indicated. A bush of the male plant in full bloom is very handsome as it stands up or juts out from the rocks amongst which it grows. Opinions are divided whether the catkins of this or the yellow ones of *S. lanata* are the more beautiful.

XI. *Terminalæ*. Catkins solitary, terminating the branches.

The group includes *S. herbacea* and *S. reticulata*, with their hybrids. They differ from all other British Willows in having terminal catkins. The other sixteen species throw off the growing point with its undeveloped leaves at the end of the growing season, and their catkins must necessarily be lateral. The only exception to this is due to a second flowering during summer. *S. triandra* often behaves in this way. *S. undulata*, which is a hybrid between *S. alba* and *S. triandra*, blooms in April and May, when it has lateral catkins and glabrous ovaries. It often blooms in July when one catkin terminates each branch, and the ovaries are pubescent on the upper half. This is a peculiar phenomenon, because both the reputed parents have glabrous ovaries.

S. herbacea is the smallest British shrub. It often occurs on exposed and windy parts of mountains where no other vegetation can exist. The branches ramify under the stony soil, and the tips appear just on the surface, carrying three leaves as a rule, and one tiny catkin nestling amongst the leaves. *S. reticulata* is a squat little bush with rigid branches, and is easy to recognise by its leathery leaves, netted with wrinkles above, and with corresponding depressions beneath.

A STOAT AND HER FAMILY

By JOHN E. S. DALLAS

RAMBLING one evening last June through some hilltop woods in Kent, my wife and I came upon a shallow trench, dug during the war, and lined with interlaced hazel. As we approached, we saw a large brown object moving over the low herbage near the farther rim of the trench. By cautious movement towards it, we were able to see that it was a stoat carrying on its back three young ones, while four others ran closely by its sides.

On hearing our steps the parent stoat turned and caught sight of us, then dashed back at full speed along the margin at the top of the trench, the three youngsters still clinging to her. At this alarm the other four dropped into the trench, where we saw them trying to dig themselves, hind-parts first, through the interlaced hazel into the light earth of the trench.

We awaited events. Presently the old stoat came back—this time along the trench itself—to within five feet of us, called to her young, one of which crossed to her in front of us. It was at once seized by its neck, and hanging limply, was dragged hurriedly along the trench.

We again waited breathlessly. In less than two minutes the devoted mother was back, called again, and another youngster crossed the trench to the unceremonious safety of its parents' jaws.

We still waited, but no further dramatic events took place. Meanwhile the two young stoats which were left, had dug themselves well into the sides of the trench, and my wife, her hands covered with leather gloves and handkerchiefs, tried to eject them with a stick from behind. They were forced to the mouth of their burrow, and I only regret that my "snapshot" was foredoomed to failure in the waning light and in the dark wood, for the youngsters bunched their claws up to their muzzles, showed their tiny teeth and hissed at us like fiends incarnate.

We may think of the stoat as a bloodthirsty villain, but this example of maternal courage turned into quick and resolute action under the very noses of the little animal's arch enemies might well have stood as a pattern for the men who were trained in this very trench.



NEST AND EGGS OF GREATER BLACK-BACKED GULL
Isles of Scilly
Greater Arthur Island. June 12th, 1926.
Photograph by Miss C. Longfield.

SOME PROBLEMS OF BUTTERFLY MIGRATION

By C. MELLOWS, M.A., F.E.S.

TILL a few years ago scarcely anything had been written about the migration of insects, though the fact that butterflies, like birds, do migrate at times was known long ago. Our ancestors were little interested in butterflies and their doings. There is no literary tradition about the wanderings of the Painted Lady or the Clouded Yellow, such as the romance of Philomela or the travels of the stork and the swallow supply to the languages of half the nations of the North. Yet if a butterfly is to many a trivial or an inconspicuous object, a butterfly at sea is a challenge to the imagination, and a flight of butterflies on their travels is something to remember. So we find in chance records as early as the middle ages, that butterfly clouds have excited interest in several places in southern and central Europe. There is a quaint legendary tale of a battle checked by a rain of butterflies, and a most picturesque record in Holinshed's *Chronicles* of a plague of Cockchafers at Gloucester in a time of snow. Superstitious terrors have been evoked by insect hosts that "drizzled blood" or darkened the sun. The wanderings of the locust-hosts are recorded very early in the annals of their victims, and no wonder. But observers in earlier days merely saw and marvelled: they seldom recorded, and it occurred to no one to devise an explanation of the unusual sight, unless to suggest rather quaintly that butterflies like other devout persons, "seken straunge strondes and ferne halwes," taking the path to Rome, or the pilgrim's way to Mecca.

In the tropics where butterfly swarms are more familiar they have been put to strange uses. Their seasonal migrations serve as a sort of Shepherd's Calendar; weather prophets predict by the coming of the butterflies, while the credulous find in them signs and portents. But with ample scope for observation has gone no readiness to reason or enquire.

So to the naturalists of the present generation has been left a puzzling problem, or rather a series of problems of an equal fascination and complexity. Here are a few of the questions that we can ask without any certainty of finding a reply, as we see and record the visits of our English migrants.

Where do the insects come from? How do they contrive to come so far and to fly so long? Why do they come? Can we find any evidence of purpose, of a sort, in their travels, or is the visit a mere chance affair? Do they follow blind impulse, an instinct for the preservation or improvement of their kind, or are they merely the victims of

circumstances and playthings of the weather? If there is evidence of purpose in their coming, have they come to stay, or like most of the birds to return? Is migration related to the normal dispersal of animal forms, or something distinct, and playing a separate part in the evolutionary process? What is the 'good' of Migration?

Hardly any of these questions can be answered confidently at the present time. But readers of the "Entomologists' Record" (1900-1902) and of Mr. C. B. Williams's articles in the "Transactions of the Entomological Society" during the last few years (and especially in 1923), will find that they have at least been asked in a fascinating as well as a scientific manner. And something has been done to clear the ground by rejecting theories, which modern observations can definitely disprove. But as we reject one theory to fall back on another, a suspicion gains ground that we are trying under one heading to deal with several utterly different phenomena.

The present article is a summary of a lecture delivered on November 9th, 1926, to the London Natural History Society, attempting to discuss the question from the point of view of the all-round naturalist rather than the specialist, and to show into what curious and interesting by-ways the enquiry leads. In a lecture given extempore or from notes it is easy to be digressive and suggestive without reproach, but to reproduce one's numerous digressions is to make strange reading. I borrowed freely with imperfect acknowledgment both in illustration and in argument. I could hardly do otherwise without being very tedious. So in following the general outlines of the lecture I have used other men's arguments as my own, without encumbering the article with a detailed list of references to the works in each case consulted.

Interesting controversial matter will be found in "Nature," 1925, the "Entomologist," November, 1926, the "Journal of Experimental Biology," 1924, the "Entomologists' Record," 1902, etc. I have not been able to consult the German literature on the subject; no doubt it is very complete. The Americans seem to be faced with quite different phenomena from those on which we base our theories in the west, and their views are unlike ours.

The year 1926 might be described as a migrant year in this country. Of butterflies we saw *Pyraeas cardui* in great numbers, and that rare visitor *Lampides baeiticus* made its appearance on the south coast. The limited numbers of our own native *Pierids* were greatly reinforced by a large migrant swarm from overseas in July and early August. Moth collectors in the favoured district of Cornwall and South Devon found a larger number than usual of both regular and occasional migrants such as *Caradrina exigua*, *Leucania unipuncta*, *Heliothis armigera*, *Sterrhiasacra* and others. Among various records of migrants caught in South Devon in the autumn is one of unusual interest. Mr. P. P. Milman caught at sugar a specimen of the very rare *Thalpochares ostrina* var. *carthami*. It was in perfect condition and had presumably just emerged from the pupa. I am not clear whether a further record in the January "Entomologist" refers to the same or to another

specimen. But in either case a brood was probably raised from eggs laid in South Devon earlier in the summer. Its larva feeds in the stalks of thistle or of *Helichrysum*, and is very unlikely to be imported (as may *armigera*) by accident.

Now where did it come from, and how did it come? It came not less than 500 miles, perhaps much further, for like *S. sacra* it is almost as rare in central Europe as it is here, and its real home is the Mediterranean. How can so small and fragile an insect have travelled so far?

A suggested answer to this question is given by Dr. E. P. Felt, writing in "Nature" two years ago. He says it is not a proper migrant at all, but has drifted here willy-nilly with the wind, "carried by the higher velocity of upper air-strata, gaining these by the aid of convectional currents arising from heated earth surfaces, now known to extend to a height of at least a thousand feet above the land surface." So an insect or its parent, flying about in a district perhaps just north of the Sahara, suddenly found itself lifted high up in the air, and carried swiftly northward by a strong south wind, to be dropped exhausted when it could fly no longer, or to be carried downward by another convectional current as the air chilled by contact with the cooler surface of the English Channel. It came in mixed company, for presumably moths and butterflies and other insects were carried to us in that same stray wind.

This is a simple theory and will commend itself to many. Small insects are doubtless carried long distances by the wind. Mosquitoes have been recorded at lighthouses far out to sea, when strong land breezes were blowing. Gossamer spiders have been found floating at very high altitudes, their parachutes propelled by the wind as readily as dust or thistle-down. Travellers in the desert have found aquatic insects, and domestic parasites like the house-fly carried as much as fifty miles from cultivation. Insects of several species reappeared on devastated Krakatoa not long after every living thing had been destroyed. Most interesting of all is the evidence of the Oxford University Expedition to Spitzbergen in 1924. On the ice desert of North Island they found in several places many miles apart specimens of a black aphid (*Pilachnus piceae*) and a hover-fly (*Syrphus ribesii*) which could be shown to have travelled at least six hundred miles in a southern gale, which was blowing at the time, in order to reach the island. When first discovered on the snow they were fresh and lively after their long journey, but in a day or two all found were dead: and soon all were covered with snow. This was an extreme instance, well-authenticated, of involuntary 'migration,' or perhaps we should say involuntary transport, by the weather.

There is another feature of Dr. Felt's theory familiar to all observers who travel in the high mountains. Our well-known migrant friends *P. brassicae* and *rapae* may be seen at times in the Alps acting in a most unaccountable way. On a very warm and calm day in August I stood and watched specimens of *brassicae* mount vertically in the air, thousands of feet above the Glacier du Trient. They passed close by

me and any wind there was seemed so light as to be almost negligible. In early April of the cold and backward season of 1924, I recorded a fresh and lively specimen of *P. brassicae* flying above deep snow on top of Monte Marito 7,000ft. in the Alpes Maritimes. Crossing the great Arolla Glacier in bad weather in September, 1923, I saw many *Pierids* of both the common species, living half-frozen on the ice in places about 9,000 feet above sea-level, to which they could scarcely have been carried by any other way than by a direct descent from still higher altitudes.

English observers living on the sea-coast expect migrants when the wind is in a certain quarter at certain times of the year. Thus Devonshire and Cornish migrants are said to arrive in early June with a south-east breeze. Entomologists who have studied the weather conditions when migrants arrive, tell me that this is the case, and expect certain butterflies from the sea with a sea breeze. It is not easy to fit in this belief either with Dr. Felt's theory or with those of his opponents. It is conceivable of course that butterflies descending on the cool Channel might finish the rest of their journey on the surface-level with a sea breeze. But it seems at least as likely that they came all the way across the sea at the lower level, and Dr. Felt has ignored the immense amount of evidence of those who have seen swarms flying at sea level far out to sea (*e.g.*, 500 miles West of Sierra Leone in the face of a sea breeze, or long distances from Trinidad, or in the middle of the Mediterranean). On a ship thirty to fifty miles from the coast of Egypt were seen or caught on April 27th last year. *P. cardui*, *L. boeticus*, *Deiopeia pulchella*, *Plusia gamma*, *Agrotis upsilon*, and *C. esigua*. This evidence (of Mr. C. B. Williams) is extraordinary. Every one of those insects is a notable migrant, and several of them, especially *upsilon* and *gamma* were extremely abundant immigrants on our own south coast the same summer. He justly asks if it is likely that even if the wind were south and violent (and it was neither) these insects would be picked out of all the insects abundant in North Egypt in the spring, for an involuntary voyage to northern regions.

The theory of insects being conveyed northward on upper air currents is moreover not merely based upon an unproved assumption that such currents exist. It is actually contrary to the meteorological records of Egypt and the Mediterranean, so far as they can be given, for currents at all heights above sea-level. During the migrating period the surface wind blows steadily from the north, and the wind at higher levels is from the west. At no level is it such as to transport butterflies involuntarily in a northerly direction. Thus we are led to two conclusions: first that insects flying with the wind are more likely to do so at low levels, secondly, that much movement is actually against the wind. We cannot possibly agree with Dr. Felt that, "Determinate flight is a comparatively small factor in promoting the spread of insects." A fair survey of the evidence leads rather to the belief that among butterflies at least involuntary migration is the exception, not the rule. To state this is, however, to use both terms 'voluntary' and 'migration' in an inexact sense. In one sense migra-

tion must be *ex hypothesi* voluntary, in another the flight of insects can hardly be called voluntary at all.

In the following quotations chosen from several hundreds available, the observer discusses a form of flight independent of the wind or contrary to its direction. The first is from Mr. Mitford's observations in the "Zoologist," 1895, on the flight of butterflies in Ceylon.

"In November at Colombo a strong north wind blows daily along the sea coast, at which season clouds of white butterflies appear, flying in a continual stream extending far inland for days and weeks. They fly from the south and in the eye of the wind, and the stronger the wind blows, the more rapid their flight. I never witnessed this without the greatest astonishment. The locust with its strong body and powerful wings cannot beat against the wind but drifts with it, yet that a butterfly, with a body so slight as scarcely to give a fulcrum for the wings to bear on, and with wings offering so broad a surface to the breeze that one would expect to see it drift like a snowflake, should possess the faculty of propulsion against a strong wind gives us a clue to an aerostatic principle with which we are not yet acquainted."

Miss Cummings in a book called "Two Happy Years in Ceylon" says, "One of the mysteries of the isle is the annual migration in November and December and at intervals up to February, of myriads of butterflies in vast flights. Whence they come and whither going none can guess. When the stormy N.E. Monsoon blows strongest these delicate insects force their way against it."

Mr. Hudson in his "Naturalist in La Plata" gives a remarkable account of the swarms of the big dragonfly *Aeschna bonariensis* seen on the Pampas and in Patagonia. "The really wonderful thing about them," he says, "is that they appear only when flying before the south-west wind called the Pampero, a dry cold wind of great violence blowing from the interior of the Pampas. It bursts on the plains suddenly, lasting some ten minutes, and is most frequent in very hot weather. In summer and autumn the large dragonflies appear not with the wind, but in advance of it, and as these insects are not seen in the country at any other time, and frequently appear in seasons of prolonged drought when all the marshes and water courses for many hundreds of miles are dry, they must fly immense distances, flying before the wind at a speed of seventy to eighty miles an hour. At times they go by like a flash and instantly disappear from sight: but generally they appear ten minutes or so before the wind arrives. In the expressive vernacular of the Gauchos, the large dragonfly is Hija del Pampero, son of the south-west wind. All journey in a N.E. direction and not a single insect ever returns." He goes on to describe the insects as displaying intense terror, and says that those few which settled in woods and plantations on the way clung on for dear life.

If Mr. Hudson is right in all his facts, either the insects started with a swift wind and completely outstripped it in speed, or else their flight was from the first independent alike of force and direction of the wind, and was merely a panic flight due to the coming of the Pampero.

But whatever the origin of their migration, it is an entirely different phenomenon from drift with a stray wind.

Migration as we understand it may take various forms. Sometimes insects are found assembling in vast numbers, just as the swallows assemble for the autumn migration, or as the young starlings flock in late summer, though it would be difficult to say whether their purpose is the same. Large flocks or clouds of insects may be seen flying in close formation, or insects of one species or more may be seen flying in little groups of three or four, or even singly, in one direction; the whole flight extending perhaps over many miles, and taking days to pass one definite point. The behaviour of migrant insects, again, like that of migrant birds, is not always uniform, though it is commonly marked by a strange purposefulness and persistence. A very curious form of migration observed by Mr. Williams in Central America concerned *Calpodus ethlius*, the West Indian Skipper. They were described as flying in thousands south-east or east at a great speed in hazy, windless and almost sunless weather. Those caught were all females. The peculiarity of their flight, apart from its speed, was that it changed direction; they were estimated as exceeding a speed of twenty miles an hour.

An account of observed migration would be incomplete without the following, first recorded in "Nature" in 1879 and quoted in the "Transactions" of December, 1926. The observer, Mr. S. B. Sketcheby, was residing in the Sudan.

"Some at least of the swarms of *V. cardui* originate in Africa, one of which I witnessed a day's march west of Sowakin in Nubia in March, 1869. Our caravan had started for the coast, leaving the mountains shrouded in heavy clouds, soon after daybreak. At the foot of the high country is a stretch of wiry grass, beyond which lies the rainless desert as far as the sea. From my camel I noticed that the whole mass of the grass seen seemed violently agitated, although there was no wind. On dismounting I found that the motion was caused by the contortions of pupae of *V. cardui*, which were so numerous that almost every blade of grass seemed to bear one. The effect of these wriggings was most peculiar, as if each grass stem was shaken separately, as indeed was the case, instead of bending before a breeze. Presently the pupae began to burst, and the red fluid that escaped sprinkled the ground like a rain of blood. Myriads of butterflies limp and helpless crawled about. Presently the sun shone forth and the insects began to dry their wings, and about half an hour after the birth of the first, the whole swarm rose as a dense cloud and flew away eastwards towards the sea. It was more than a mile long and its breadth exceeded a quarter of a mile."

In this connection we can answer one of the questions naturally asked by an English collector about our immigrants—where do they come from? There is clearly no one district which is the birthplace of all our migrant swarms. They will come from those districts where the butterfly population is unusually large and, in some cases at least, where the larval food-supply is inadequate. There are some places

where these conditions often recur, such as the Nile basin, the Atlas foothills and the districts north and west of the Euphrates basin. These act as a kind of reservoir from which butterflies from time to time overflow. The same conditions which may induce migrating in one of these districts may act as potently in others as well, and the swarms may get to work simultaneously. They may even mix. The impulse to wander is perhaps inherited, and a swarm that has started to migrate will often lay eggs at an intermediate stage in the migration, the resulting insects continuing their parents' wandering that has been thus interrupted and pursuing the same direction as their parents, after two months' delay. Migrants may therefore come to us from the original 'reservoir,' or from a point midway between that district and our own.

While local migrations in our islands are not uncommon, as records in the distribution from year to year of such insects as *P. C. album*, *Eurois occulta*, etc., seem to suggest, it may safely be laid down that nearly all the insects coming overseas to us come very long distances. Exceptions may be perhaps *P. brassicae*, *P. rapae* and the Scandinavian race of *Vanessa antiopa* which from time to time have visited us in large numbers. There is another well-known peculiarity about our rarer migrants, and that is that several of them, such as *C. exigua*, *H. armigera*, *L. unipuncta* and others are a plague in many parts of the world, while quite unable to thrive in our own country. Conversely it is true that some of our insular species, introduced to countries overseas, such as New Zealand and some Polynesian Islands, thrive exceedingly at the expense of local insects and become a nuisance.

How do the immigrants come to us? The question is not easy to answer and any reply must be controversial, but on a fair survey of the evidence we believe they come independently of the wind as a rule, flying low, and in a head-wind, very near the surface. The fact that butterflies have been often caught far out at sea suggests that, like day-flying birds, they may change their habits under the influence of migrating impulse and travel by night as well as by day; and several well-known migrant butterflies, such as *P. cardui* and *atalanta*, have been caught at night, flying round gas lamps or at lighthouses. But as a rule they fly by day only. Their oversea migration is made much easier by a trick some butterflies have acquired of settling on the water without wetting their wings, and "taking off" from the wavelets. This habit, well-authenticated in the case of some Pierid swarms, can hardly be practised except in fine weather and on calm seas, and the discovery of large numbers of drowned insects (as of *Vanessa antiopa* on the Northumberland coast in 1872) shows that if indulged in too often it leads to disaster. Examination of newly arrived migrants shows that many, but by no means all, show traces of exhaustion. Some of the swifter-flying insects disperse rapidly as soon as they reach this country.

Next we shall discuss the composition of migrant swarms. They are commonly mixed, and often contain a number of "accidental"

arrivals of other species, attracted by a well-known imitative instinct which draws insects on the wing after the swarm. Mr. Sanderson's Malay swarm of *Delius ninus* and *Pyramus* quoted below, contained not only moth mimics of these insects, but mimics of the mimic species. An observer records (in Tutt) a swarm of white butterflies accompanied by an *Aeschna* dragonfly which preyed on the insects, and by the small *Apanteles* parasite as well. Some migrating hosts are composed largely of females, in others the sexes are about equal in number, while an extreme instance is quoted by Tutt where Herr Gätke on Heligoland records vast numbers of *Hybernia defoliaria* and *aurantiaria* migrating. The female of this species is wingless, and if the observer was right, here there was a swarm of males. An involuntary migration of the type described by Dr. Felt would presumably contain all sorts of insects in more or less equal numbers. We do not appear to get "mixed bags" of this kind.

The comparative ease with which insects appear to cross the sea enables them to approach our coast at many places other than the traditional crossing-places from the continent, and there are few counties along the south and east coast where migrations do not occasionally take place. The writer has seen newly arrived flocks of *P. atalanta* in the Isle of Wight and of *C. croceus* in Norfolk. *P. rapae* has been recorded coming in from the sea in North Lincolnshire. *V. antiopa* when it arrives is as likely to appear in Scotland as in north east England, and some seasons odd specimens are uncommon in Scotland. *Anosia plexippus* was recorded in south west England, but its liking for the potato lockers of ships, to which Mr. Frohawk refers in his book, rather detracts from the interest of these occasional appearances. In fact in all our migrant records the possibility of accidental introduction cannot be altogether left out of account. A very interesting record in the arrival of *C. croceus* is that in one year it was abundant in south-west Ireland and hardly recorded at all in other parts of the British Isles. *C. croceus* is a common insect in Portugal and the Canaries. Some insects on reaching our shores travel far inland: thus, in a good migrant year *C. croceus* and *P. cardui* will be recorded from almost every county in Great Britain up to the far north. But others appear to lay their eggs on the very edge of the seashore; and the sea coast of Devonshire is undoubtedly the best place to find migrant *Heterocera*.

Although migrating birds and insects not infrequently come under the same weather conditions, and in company, there is no real parallel between the migration of birds and that of butterflies. The former come and return at well defined seasons, some of them making the British Isles their farthest limit and others passing through our country on their northward journey. Insects, on the other hand, have no return flight. The original migrants live only a few days or weeks, and their offspring make no attempt to fly back, as do the birds to their southern home. It has been suggested that the American *A. plexippus* flocks in the autumn, like the swallows, to fly south, but there is no reasonable

evidence of a southward flight, and butterfly flocking appears to be a distinct phenomenon as often as not unconnected with migrating.

Few if any of our immigrants have any chance of staying and living in England. The condition which leads to over-population and a resultant migration, is the same in many species. It is many-broodedness, or continuous-broodedness, a habit which in our own climate is fatal. *C. croceus* sometimes hatches two broods and the later emerged insects may be taken in the sheltered south west as late as Christmas or even mid-January, but these always die without breeding. Our winter is too cold and wet for the larvae. *P. cardui*, which is equally unsuccessful, is generally killed as an imago because it has never learnt the trick acquired by *V. urticae*, and apparently partly acquired by *P. atalanta*, of hibernation. Some insects are doomed to fail because they have come where there is no food-plant. *D. plexippus* has often made its appearance where there was no *Asclepias* for its larva. On the other hand, *P. moneta* managed to establish itself generally in this country where the habit has grown up of planting Delphinium and Aconitum commonly in our herbaceous borders. I have never heard a satisfactory reason for the failure of *V. antiopa* to live here; on the other hand, there appears good evidence that it was a native here and died out.

The greatest difficulty that a migrant insect must meet in England is the variation in English winters, some of which are far too cold for southern species, while others are still more deadly in their combination of cold and damp. Our temporary spells of fine warm weather, such as often entice out *V. urticae* and *G. rhamni* during January, are particularly treacherous to all insects that are not fully acclimatized to the peculiarities of our weather. Even if a series of very favourable winters in a favourable locality bred a half-hardy local race, the partial immunity which it had acquired would from time to time be in great danger of being lost, as its stock was mingled with the migrant swarms of southerners that come over year after year only to die.

On the other hand it must be admitted that two insects at least, *Hypolimnas bolina* and *Danaus chrysippus* have within recent years succeeded in crossing the sea and establishing themselves in a new district where now they flourish.

In deciding how butterflies migrate the question must naturally arise how far their flight can be explained on a mechanical basis. Loeb has shown in his experiments on the robber-fly that insects react mechanically to the rays of sunlight, in the position they take up when they settle. May we say something of the same sort in their reaction to wind and temperature? Do they react positively and negatively to wind currents as certain fish, the salmon or the eel for example, react in the course of their migrations to the flow of rivers and the tides and currents of the sea? Young eels as they disperse to their feeding grounds are content to follow passively the surface currents of the Atlantic that lead them to the Baltic or the Mediterranean or the coasts of Western Europe or Eastern America, and breeding eels descend, always with the stream, from the rivers and headwaters where

they fed, to seek the spawning grounds and the ocean-abysses where they will spawn and die. For the greater part of their wanderings they follow the line of least resistance. Very different is the behaviour of the salmon as they mount the rivers to spawn. Streams and currents are to them a kind of challenge, an obstacle to be fought and surmounted. It is said that a spent and exhausted salmon will descend the stream tail first, feebly fighting the current that takes it to the sea.

The contrast between the two fish would seem at first sight complete: but probably this is not really the case. The movements of both are largely determined by physiological changes inside them. Thus the salmon in going to the sea to feed grows healthy and fat. As it stores fat its specific gravity is reduced and it is forced to leave the salt water for a fresher and less buoyant medium. It makes its way instinctively, and even fights its way, towards the richer supply of oxygen which has become a necessity for it at a certain stage in its development. It has a nerve mechanism responding to the temperature of the water in which it lives, and thus a rise of temperature without will increase chemical action within and so increase the speed with which the fish responds to other stimuli, such as the change of density in the water and oxygen content.

Butterflies, like fish, are stimulated to migrating activity by a rise in temperature, and some species seem to wander in search of an optimum temperature, their wanderings corresponding to some extent with periodic changes of climate. Thus the winter temperature of North Africa is normally suited to *P. cardui*, and in a typical winter the species will increase rapidly and send out swarms in spring to southern Europe, while later in the year the butterfly can accommodate itself to the summer climate of northern and central Europe. But a cold January in Africa completely checks their development, and after such a setback there is practically no attempt in the spring to extend their range. In 1925, after a cold spring in Africa, there were few *P. cardui* in Europe, while in 1926, weather conditions being favourable, the insect was to be found everywhere in the summer.

Butterflies can stand great heat, but they cannot get on without moisture. In the tropics, where seasonal winds blow steadily for long periods, a strong breeze blows into the hot and dry areas from cooler and moister regions. So in order to be carried to an area where famine conditions for the larva will not prevail, an insect must fly steadily in the face of the wind. On the other hand, where the winds are hot and dry the butterfly will do the best for itself and its species by flying with the wind or perhaps diagonally across it. Butterflies perhaps seek an optimum moisture and air pressure as well as an optimum temperature. It has been suggested that barometric depressions affect their migrations: and it is highly probable that electrical disturbances encourage them.

Observers in Panama, East and West Africa, Ceylon and New Guinea have all reported numerous instances of butterflies flying in

large numbers in one direction, and it is clear that where wind conditions are uniform the insects will show great uniformity in the direction and the periodicity of their flights. But their direction bears no fixed ratio to the direction of the wind. A few have been reported flying with the wind, a larger number as flying against a moderate breeze, and the majority have been seen flying across wind. Butterflies have been seen flying directly out towards the Atlantic from South America, and others flying in apparently from the Atlantic. But in both these cases their flight seems to have been deflected by a shifting of the wind. In this connection Dr. Gough's notes on the flight of locusts are interesting. "In a gentle breeze," he says "they fly directly up the wind. In a moderately strong wind they change their direction relative to the wind and fly at right angles to it, while as the wind-velocity increases, their line of flight is turned more and more until we find them flying down the wind when a gale is blowing." He believes that they "turn one flank to a rising wind, and the other to a falling wind." It seems likely that many butterflies will thus tend to respond quite mechanically to variations in wind force and direction, though this is an entirely different thing from their drifting passively with the wind.

There are several remarkable instances on record of butterflies reversing their migratory flight in the course of the day so as to fly to and fro without making any progress in their travels. An observer in the trenches before Gaza in April, 1917, who had a good opportunity to make accurate observations on several successive days, records *P. cardui* flying in batches of 5 to 12 N.W., into cultivated land at 9.30 a.m., and returning in the same formation but in somewhat diminished numbers about 5.30 p.m., flying S.E. towards the desert. This they did for about a week. Conditions in Palestine are very suitable for this trapping of migrants. The weather conditions are almost every day the same. A N.W. sea breeze blows about 9.30 for eight hours, and is followed by a land breeze blowing in the reverse direction for most of the night. From 7.30 a.m., the air is windless and very hot. Under very similar conditions an almost identical to and fro migration of *Belenois mesentina* was recorded some years later. Similar conditions prevail in Selangor of the Federated Malay States where a curious to-and-fro migration was recorded in March, 1920. In this case the insects flew Eastward in a long straggling line for an hour and a quarter in the evening, returning in the same straggling formation thirteen hours later. They continued to fly to and fro for a fortnight.

In each instance it seems pretty clear that the direction of the butterflies' flight was determined and maintained by a sensitive reaction to the wind current, and as they reached a locality where morning and evening breezes blow with equal force in opposite directions, they wandered to and fro without passing out of the district.

It remains to be seen whether a physiological reason can be given for the flight of the insects, as for the migration of fish to and from the sea. In this connection it is interesting to note that just as the breeding eels store fat to sustain them on their ocean wanderings, so

several species of migrating butterflies show traces when dissected of enlarged fat bodies, which the insect does not normally possess. We are not justified, however, in pressing the analogy, for very many butterflies show no signs of this fat, but on the contrary both sexes seem quite normal.

We have finally to outline some theories on the 'good' or 'end' of migration. The extraordinary persistence with which some butterflies seek to extend their range, and the great vigour of some of the well-known migrant strains, suggest that migration has a purpose and is definitely useful to the species. But when we ask why butterflies migrate it is not so easy to find an answer. Some insects seem to be always on their travels, while others go abroad but rarely, and then either at long distance periods or under some special strain. We might suppose migration to be a device to secure cross breeding, like the second cast of the honey bee, or the odd wanderlust of *Arctiid* larvae about to pupate, and the selective egg-laying of *Papilio machaon*, but there is very little evidence in the behaviour of migrant females to support this view. Some finish their wanderings before the eggs are developed, others "seem possessed with the one insane desire of getting rid of their eggs with the utmost expedition, and then madly continuing their flight." Others like *Catalpodes ethlius* do appear to lay their eggs continuously as they go from stage to stage of their northward journey. There is a little evidence, but not much, to support the theory that migration is a device to correct inequalities in the numbers of the sexes. A preponderance of males or of females is certainly dangerous for the species, and from time to time these inequalities do occur. In some swarms there is a very prominent male or female element, and some, as we have explained, are of one sex only. Those who suggest, on the other hand, that insects migrate to escape their natural enemies, whether insects of prey or parasites, must explain several awkward facts. As flocks of birds are often followed overseas by hawks and owls, so insect swarms are accompanied by insectivorous birds and insects, which take toll of them as they go. It is obvious that, starting life as an emigrant under new conditions, an insect will have a hard struggle and has foregone much of its natural protection.

Others have conjectured that just as a swallow, with its need of an unlimited insect diet during the breeding season, is led to explore summer areas where insects abound, so will butterflies go far afield under pressure of 'hunger' to find new food supplies that only an unusual effort could enable them to reach. The word 'hunger' must of course be modified. A migrant butterfly is not hungry at all. Like the swarming honey-bee or the locust, it is well-supplied with food for the journey, and perhaps we should describe the stimulus rather as "maternal instinct." But any observer who has watched *C. croceus* and *hyale* scattering among the fields of clover and lucerne, will feel how strange is the impulse to seek new and unexplored food areas for their offspring.

Much less probable, in the case of insects at least, is the 'homing' theory which supposes that the swallow and the cuckoo return every

year to breed in their old home in the north where once they lived all the year round and from which they were driven long ago by a change of climate. In the butterflies there are obvious differences. They do not fly south for the winter. They follow no uniform rate in migrating. They can hardly be said to show any trace of inherited memory. Besides the problem is utterly different for them. A swallow cannot hibernate or pupate or "lie over" for the winter. It must go where food is or starve. So the swallow goes south in autumn to the district of the longer days and the brighter sunlight where food abounds: while the sparrow has solved in its own way by a change of diet the problem of feeding summer and winter alike in northern latitudes. The butterfly has relatively few requirements. In the larval stage in many species it can feed by day or night and has little need of sunlight. As a pupa it can stand prolonged and intense cold. But few species can change their diet, and the more delicate insects fail to live in our northern latitudes simply because they cannot modify their breeding habits so as to remain nine months instead of three weeks as ovum or pupa or hibernating larva. It seems highly improbable that an insect once living here has changed its way of life to accommodate itself to conditions in the south and cannot change it again.

Lastly we have the "hunger swarm" theory. Mr. Elton in a very interesting paper on "Periodic Fluctuations in the numbers of animals, their causes and effects," has shewn that in certain parts of the world, where meteorological conditions are relatively simple to study, such curious events as lemming swarms and plagues of mice may be shown to follow periodic changes of climate corresponding to sunspot activities. He shows that a sunspot cycle of 11.2 years is much in evidence in the growth and reproduction of plants and animals, and he is able to calculate and foretell fat and lean years among some animals and birds with some accuracy. The migrations of Pallas's Sand-grouse, which lives in central Asia and in some years reaches this country, are said to confirm this theory. Such periodical changes might operate in two ways to produce migration. Very favourable climatic conditions would lead to an excessive increase in the numbers of the animal, and over-population would lead to a hunger swarm. This is what happens to the lemmings. Myriads of young lemmings descend from their mountain home on to the cultivated lands which they ravage disastrously. Many of them even swim out to perish in the open sea. The survivors are always visited by a pestilence which reduces their numbers below the former level. This action of the lemmings seems uncommonly like wholesale suicide on the part of a large element in the population to leave the ground clear for the rest. And in this negative way migration must be good for the species of the lemmings, and for that of those butterflies that have been recorded in vast numbers flying straight out into the Atlantic or the Pacific to certain death.

On the other hand one might expect to find a hunger swarm resulting from a very unfavourable year if this led to a shortage of the food supply and not directly to a diminution of the species. Cold and

wet seasons would indeed be very unlikely to encourage migratory activity. But hot dry seasons will at once excite it and make it necessary by parching up the food plant of the larvae and obliging the insects to go elsewhere to oviposit.

In this way *P. cardui*, and *A. pleurippus*, to quote two among many migrants, as they make their almost annual attempt to extend their range northward, occupy no new ground and leave no permanent colonies anywhere in the northern regions. But at least they have eased the overcrowding in their original home and perhaps avoided the pestilence which overcrowding always brings. To this limited extent only can all migration be definitely called beneficial to the race. All other purposes can only be described as conjectural, and to generalize safely on the subject requires a great many more scientific and accurate observations than we have yet at our disposal. In all its main features insect migration is still an unsolved mystery.

THE BIRD'S NEST ORCHIS

By JOHN E. S. DALLAS

THE clearing, not long since, of some woods near Mickleham, which formed the most important station within the Society's district for *Neottia nidus-avis*, may be urged as the excuse for this short note.

The English name is derived from the plant's roots, which are more or less like the basket-shaped nest of a bird. It is our only saprophytic orchis, obtaining probably the whole of its nourishment from the decaying beech leaves among which it invariably grows. The whole plant, root, stem, bract-like leaves and flowers, is light brown in colour, having no chlorophyll, and is fleshy in texture.

The species is recorded from some ten or twelve stations within the Society's area, and I may mention that although at the Mickleham station the ground occupied by the plants has been greatly reduced, a good number still grow in a section of the wood which remains standing. Just beyond our area, on the chalk hills between Dorking and Guildford, and on the Kentish Downs, it is not uncommon, and it has several stations on the Chilterns. In other parts of England it is not infrequent in beechwood districts; the South Downs and the Cotswolds may be given as localities where I have met it myself.

The Bird's Nest Orchis is in flower in May and June, and I can think of few flower scenes more idyllic than dozens of this interesting plant backed by the dark screen of a neighbouring pine-wood, while over them wave the graceful boughs of the beeches, their fringed silky leaves catching the only light which pierces the green vault of early summer.



THE BIRD'S NEST ORCHIS
(*Neottia nidus-avis*)

Photographs by I. E. S. Dallas

RABBITS AND BUTTERFLIES

By R. W. ROBBINS

THE food plant of our two chalk hill "Blues," *Agriades coridon*, Poda, and *Agriades thetis*, Rott. (*bellargus*), as is well known, is the Horse-shoe Vetch (*Hippocrepis comosa*, L). This small vetch is widely distributed on the chalk and limestone formations of England, although it does not seem to be plentiful everywhere within its area. At any rate, it is rare on the southern slopes of the Downs in East Surrey, the thin soil and hot dry exposure being perhaps unsuited to its needs. Consequently, on this part of the Downs, these butterflies are very restricted, and, in ten years residence at Limpsfield, I have found them only in one spot within a range of some few miles—an old chalk pit above and just to the east of the great chalk pit at Oxted, which is so conspicuous a landmark from this part of the Weald. Here on the floor of the old pit, about 700 feet above sea level, the vetch was found abundantly, and in August plenty of *A. coridon* were present to be joined later by a smaller number of the second brood of *A. thetis*.

This isolated colony of *coridon* was interesting, for perhaps 20 per cent. of the females were more or less suffused with blue above, with undersides of blackish and greyish tones, in place of the normal brown. There was also some variation in the males.

In August 1920 I noted in my diary that "*A. coridon* was very abundant" at this spot. In the second week in September fresh females were still to be found and at the same time 25 or 30 male *A. thetis* were seen. Subsequent years show a diminution in numbers, but in August, 1924, *coridon* was still "not uncommon."

In 1925 I do not appear to have visited the spot in August or September. However, on August 12th, 1926, I spent the morning on the ground. It was a sunny day with passing clouds. Not one example of *A. coridon* was seen. There was a striking absence of butterflies of any species. Puzzled by this, I examined the ground with some care. The herbage was close-bitten, the only plants standing above the turf being the Yellow Wort (*Chlora*) the Centaury (*Erythraea*) and the Autumnal Gentian, all belonging to the *Gentianaceae* and containing a bitter principle. Rosettes of the Stemless Thistle (*Cnicus acaulis*) were abundant, but I failed to find one with bud or flower. These buds are solid, "nutty" and not spiny; they had vanished. Each rosette had a raw bitten centre. A lengthy search was made for *Hippocrepis* but it was fruitless. Neither on the floor of the pit, nor on the surrounding slopes, where a few years ago I had seen the "Blues" depositing their eggs, could the vetch now be found. The conclusion was to me irresistible. Rabbits, whose pellets were plentiful on the turf, had taken possession, and in their relish for the tender and

probably tasty little vetch, had wiped out our "Blues," eggs and larvae alike.

What is the explanation of this great and apparently sudden increase of the rabbits? They were always to be found in small numbers on these slopes. A cottager told me that, now the neighbouring woods are again preserved, shooting rabbits was forbidden. But I doubt if they were ever shot on the hills more than at present. The chain of causation is, I think, longer than that.

In the immediate neighbourhood are eight or ten cottages occupied by workers in the chalk pits; other workers come from a distance. During the War, particularly in the period of rationing, snared rabbits were a welcome addition to the family meal. After the War, wages rose to unknown heights, butchers' meat was freely procurable, building recommenced, lime was in demand, and with regular work at good pay the lime workers, except perhaps in their cottage gardens, no longer concerned themselves with the rabbits. The disappearance of the chalk hill "Blues" from the Oxted downs is, in my view, a direct result of the post-war boom in the building industry.

NOTES ON PLANT-GALLS

By H. J. BURKILL.

(1) *Hypericum elodes*, L., galled by larvae of a midge. The terminal leaves are curled and crinkled, and in the folds thus produced live a number of maize-yellow coloured larvae. Several galled plants found in one locality in Yorkshire some years ago. I have not been able to find any others or to hear of the gall from other sources.

(2) *Hieracium pilosella*, L., galled by *Eriophyes pilosellae*, Nal. A neat, tight rolling of the margin of the leaf upwards. Also from Yorkshire.

(3) *Primula veris*, L. The whole of the flowers on the stalk completely distorted, the calyx and corolla being cut up into ribbons. Densely hairy. Apparently due to Mites but none were detected on microscopical examination. Mr. L. B. Hall found three plants affected near Debden, in Essex. (Sketch enlarged to twice natural size.)

(4) *Galium aparine*, L. The tips of the plants covered with a thick coating of white hairs, unicellular, and hooked, giving the appearance of a thin layer of cotton-wool over a patch of the plants. All the plants in one place for about twenty yards were attacked, and so aborted that no seed was produced, and the plants died out. Resembles the work of Mites, but here again, nothing was detected on microscopical examination. Has been found in three different localities near Hounslow in recent years.



Hypericum clodes



Hieracium pilosella



Primula veris



Galium aparine

ARCHAEOLOGICAL INSPECTIONS

Bow Church, Cheapside.—Visited January 2nd, 1926.

○ OUR meeting was held in the vestry of this interesting London Church. Prebendary S. G. Ponsonby gave us an historical account whilst Mr. E. S. Uunderwood, surveyor to the church, read a paper and subsequently escorted us over the church and crypt. The latter, which explains the title "le Bow," has a groined ceiling supported by simple columns, all of late Saxon or Early Norman workmanship.

After the fire of London had destroyed the earlier church (but not the crypt) Christopher Wren built the present Renaissance structure upon the ancient crypt. Wren's tower, the steeple to which rivals that of St. Brides, Fleet Street, has as its foundations a Roman pavement 18 feet below the present street level. This shows that the level of London hereabouts has been raised approximately one foot in each century since the days when the city was in Roman occupation.

A short record of our visit has been placed in our Library.

St. Peter and St. Paul Lingfield, Surrey.—Visited April 10th, 1926.

A well attended meeting took place in this typical fifteenth century church, and great interest was shown in its wonderful array of brasses and monuments, all of which are described and illustrated in our record.

The church is large, with a north aisle divided from the nave by good fifteenth century arcading. The chancel is spacious with north and south chapels, all of fifteenth century date. The tower with its fifteenth century shingled spire is on the south side towards the west end. The screens and choir stalls are of interest. The font is fifteenth century, and there is a chained bible by the south entrance. The roof covering of Horsham slabs is noteworthy. Old houses of great charm surround the church.

St. Peters Iwer, Bucks.—Visited October 2nd, 1926.

The plan of the nave of this church is undoubtedly Saxon, though late in the period. A blocked window opening of that period shows to-day on the north side of the nave. There is a fine Norman arcade on the north side of the nave and the base of the tower (which is at the west end) is also Norman. The south arcade of the nave is Early English, though it was altered two hundred years afterwards. The chancel is Early English with typical double piscina and sedilia. A fine window was inserted in the north wall of the chancel in the Decorated period. In the fifteenth century both the north and south aisles were widened.

We found the church interesting and well cared for.

H. SPENCER STOWELL, *Recorder.*

NOTES ON BIRDS ROUND WINCHMORE HILL THIRTY YEARS AGO AND TO-DAY

By PERCY J. HANSON

COMPARED with thirty years ago there is a great difference in the number and variety of the birds to be found round Winchmore Hill to-day. Then birds of many species were plentiful in the neighbourhood, and as the records of the Society show, it was visited by some very interesting strangers. Now the birds are limited in numbers and species, and interesting records are few and far between. The main factor in bringing about this difference has been the great change that has been made in the character of the district. Then it was open country and sufficiently rural to attract almost any kind of bird, but now most of it is enclosed and built on.

In considering the district it is best to divide it into four parts, roughly north, south, east and west, with the Green Dragon Hotel as the centre. By west I mean the portion on the west of the railway to the N.W., embracing Eversney Park, Worlds End Lane, and South Lodge Estate; by east, the district on the east of Green Lanes and the grounds of Halliwick House across to Bury Street; by south, Winchmore Hill Woods (Grovelands Park) Estate which thirty years ago reached across the Old Park to Palmers Green Station and Old Southgate, and by north, the fields, orchards and woodland across to Enfield on the west of the Green Lanes.

Standing at the centre the first thing that would have struck you thirty years ago would have been the fine old rookery in the grounds of Beaulieu House facing the Hotel. From my notes I find that in 1894 there were about 20 to 30 nests. In 1895, in which year the old family at the House died out, there were only two nests and in 1896 there were none. In 1897 the rooks returned and there were 13 nests besides an offshoot of 5 nests in some trees on the right of Middle Lane (now Station Road) near the village. In 1898 there were 17 nests, but in 1899 the number was reduced to 14. Soon after the trees were cut down and a row of shops built on the site. The rooks then shifted to some tall trees in Doctor Simpson's garden, Roseville, in Winchmore Hill Village, where there were 19 nests in 1920 and 17 in 1923.

West. This was a fine stretch of country and it is the part that is least altered to-day. Here one might expect to turn up anything. I find many of my best records come from this district. This is where we saw the Scarlet Grosbeak in 1897. It was on the ground under some fir and alder trees at the west end of the big lake.

Here I could always rely on finding nests of the Mallard, Coot and

Moorhen, and Herons were invariably to be seen there. Note from Diary, May 14th, 1899, "Mallard 6 eggs, another with five young which I photographed with a Coot's nest with 8 eggs. Also one with 6 eggs and another with 1 egg."

Reed Buntings were fairly common and Snipe were often flushed. This is the only place where I have heard the Grasshopper Warbler. My record is May 6th, 1906. There was also a very large Rookery here comprising about 100 nests, but no trace of it is to be found to-day. In quite recent years Linnets nested in the furze bushes on the western edge of South Lodge. The Little Grebe nested on the top lake. I have a fine lot of photographs of it, and am glad to say it is still there this year.

Tawny Owls have favoured one tree in this neighbourhood ever since I can remember, although they were not there last year. In 1923 I saw the Little Owl for the first time over there.

Among the interesting species of the district was a breed of Common Wren that always built in small holly bushes about 12 or 18 inches from the ground. The Partridge was fairly common. I have a record of a nest with 11 eggs in 1895.

I am glad to say the Woodpeckers are still to be found round there. The Lesser Spotted nested there in 1898, the Greater Spotted in 1894. I saw the Green there in 1924.

EAST. The country on the east of Green Lanes.

Hallwick House grounds was a fine park surrounded by a belt of trees and a shrubbery with a path running through it all round. This was one of our favourite hunting grounds. We could always get nests of the Marsh, Blue, Cole and Great Tits in the old trees round the shrubbery. This was also a great place for Black Cap which regularly built in the low loose hedge on the edge. In a fine old oak with loose bark we found the Tree Creeper nesting several times. In another corner, near where the train road now cuts through the park, there was a colony of Tree Sparrows. There were several small clumps of tall elm trees in the park, in one of which a Kestrel brought off its brood in an old crow's nest in May, 1900. We used to watch the old birds feeding the young. The Nightingale rested in the part near Green Lanes.

In the fields nearer Enfield we could generally find the Greenfinch. There were several nests close together. It is very curious how one species will keep near a particular place. The Greenfinch was not a common bird here. We used to find its nest in the fruit trees of Pike's Orchards, but the species was never plentiful. In the same way the Flycatchers had their own special corner and came back to it year after year.

I saw the Common Sandpiper on the New River bank on September 7th, 1919.

SOUTH. Winchmore Hill Woods and the fields across to Palmers Green Station.

"Grovelands Public Park" to-day. This was Major Taylor's Estate and reached from Winchmore Hill Village along the railway line to Bourne Hill and Fox Lane, on the south of which (built over

to-day) was the old park, from Palmers Green Station along Aldermans Hill to the Old Cherry Tree Inn, Southgate, nearly opposite which is "Arno's Grove" the old home of "Walkers" the famous cricketers. It was on the lawn here that the caretaker shot the Hoopoe in May, 1907, (see Society's Records.)

In those days this was a very nice compact estate with three game-keepers. I do not think they went in for game strictly speaking, but there was a large herd of deer in the Park and I daresay it had to be closely watched.

There were always plenty of duck round the lakes of which there were three. The large one which is now in Grovelands Park, and a small one near Palmers Green Station and the Old Moat both of which are drained and built over to-day (Derwent Road and Lakeside Road).

I never saw eggs of any of the Hawks here although we used to see the Sparrow Hawk sometimes, but I suppose the keepers destroyed the eggs or nests.

One of them told me that a fine Osprey visited the large lake for two years, but that was before I became friendly with him.

Jays were kept down at that time. I think there are more about to-day. I saw six or eight on one occasion in my father's garden in Broad Walk in 1923. I found one magpie's nest regularly for years, but the keeper used to take and sell the young birds, so they did not increase much. Last nest 1907. The bird I most liked watching was the Nightjar which was very plentiful there. It is quite gone to-day. There were also several pairs of Carrion Crows which the keeper did not seem to mind. We could always find a nest or two in the strip of wood on the south of Broad Walk which was an unfenced path in those days.

Long-tailed Tits always nested in the hedges of the field towards Happers Road which is for the most part built over to-day. There were large flocks of Mallard (nest 11 eggs 1908, largest number) and Pochard (very large flock March 4th, 1896), but there was not much need to give them cover round the edge. In fact the clump of bull-rushes on the south side was imported by the keeper and myself and planted there. It makes quite a nice clump to-day. The Little Grebe always used to breed on the old Moat. I never remember seeing Coot there; only on the large lake.

Nightingales were very plentiful. I have found as many as four nests in one season. Nuthatches are still fairly common. I saw four young in 1924. I have not seen Redstart for the last ten years. I remember one built on the side of the keeper's cottage in Broad Walk which was pulled down last year.

I think one of the best records comes from my own garden in Middle Lane (now Station Rd.) which falls in this portion of the district. We had a row of Mountain Ash trees all down one side, and on September 80th, 1907, I was very surprised to see three Ring Ouzles, two females and one male feeding on the berries in the early morning. They visited the trees each morning till October 4th.

The only times I have seen Wood Warblers in the district are May 20th, 1918 and 1922, in Winchmore Hill Wood. Flycatchers still nest in the neighbourhood. I have records for 1928-24-25-26.

NORTH. This district was the one in which I spent the most time, embracing as it did fields, a small wood, Salmon Brook, Pike's market gardens and orchards (which may account for some of the attraction).

In the early days you could always hear the Land Rail and I found several nests (last record July 22nd, 1897). Hawfinches were most often found in the top orchards near the railway, the bank of which was a famous place for Whinchats (not seen there for the last three years). Redbacked Shrike used to like the tall isolated bushes near the fields. Tree Pipits and Skylarks were always found there. There is a great difference now. Most of the bank is spoilt and a station (Grange Park) built just near where the old Horseshoe Arch went under the line (now filled in). It was in this corner where we always looked for the Wryneck. I have photos (1898) showing where it built in an old railway sleeper sticking out of the bank, with the old farm in the distance (last recorded 1920). There is a row of houses there to-day. In fact that piece of bank would take a lot of beating, with its clumps of sweet scented violets and swarms of butterflies in the summer. In winter it was visited by flocks of Goldfinch and Redpole. The latter was always rather an uncommon bird in the district. I found it nesting only once, October 30th, 1898, in a fruit tree near the bank.

The brook which runs through was always interesting especially when it flooded out over the fields. Then we had large flocks of Lapwing (November 7th, 1897 and February 12th, 1899) and Black-headed Gulls with a few Snipe sometimes (November 29th, 1897). The Kingfisher was generally to be seen, although we only found it nesting once, and plenty of Moorhens. Lesser Spotted Woodpeckers used to nest in the old willow trees on its banks, and just where they have altered the course of it, there was a colony of Tree Sparrows. Yellowhammer, never very plentiful, used to nest in this corner.

In the fruit orchards themselves the Garden Warbler was very plentiful, nesting in the gooseberry bushes, while the Greater Spotted Woodpeckers built quite low down in the fruit trees (May 1st, 1898) with Hawfinches in the taller pear trees (5 eggs May 15th, 1898) and large flocks of Tits and Goldcrest used to come in the late autumn and winter. Blackbirds and Thrushes were very fond of nesting under the rhubarb leaves on the ground.

The wood was a fine place. Barn and Tawny Owls could be heard there. The former used to breed in the old sheds and trees opposite the Green Dragon, together with a few pairs of Jackdaws. The last Barn Owl I saw nesting was under the eaves of a house in Cecil Road, Enfield, 1909. The old birds used to sit outside and caused much interest in the road.

Magpies were fairly common. I remember finding one nest with 8 eggs which could be seen from the public path. Nightingales were also

there. I found one nest in Green Dragon Lane not 100 yards from my friend's house.

Another bird that I have not seen of recent years in the district is the Red-legged Partridge. We got one nest before 1895. It would do one good even to see a covey of the Common Partridge there to-day.

Also large flocks of Finches with a few Bramblings (5/2/94) among them. I remember watching a pair of Brambling in late April, 1901, hoping they would breed, but I had no luck.

One bird puzzled us in those days. It used to visit some small ponds. We saw it fly away several times showing a white rump. I have no doubt now that it was a Green Sandpiper.

Two of the most interesting records are the Leech's Forked-tailed Petrel picked up wounded by shot at Wades Hill, now in Mr. Paulin's collection, December, 1907, and a Puffin seen by O. G. Pike and myself flying over the fields low down on January 17th, 1894.

And one bird I must not forget, Sand Martin, which used to breed in a small gravel pit in what is to-day the Bush Hill golf course, but that was before I started keeping notes, about 1892.

PUBLICATIONS BY MEMBERS

During the past year we have had the pleasure of welcoming the following books written by Members of the Society.

(1) *SKA-GIRT JUNGLES*, by C. L. Collenette, F.E.S., illustrated by photos taken by the Author or by Miss Longfield, another of our Members who was associated with him on the staff of the St. George expedition to the Pacific. Mr. Collenette describes in a fascinating manner some of the experiences and incidents that fell to his lot while studying the fauna of the different islands visited by the expedition. Chapter III. dealing with the remarkable forms of life found on the Galapagos Islands can be read and re-read with interest. Every Member of the Society who has not already become the possessor of a copy should put his name down on the Library list without delay.

(2) *EXPLORING ENGLAND*, by C. S. Bayne. Illustrated. A book dealing very fully with out-door life in a series of chapters entitled, "Fields," "The Hedgerows," "The Woods," etc., each of them crammed with information on different species of the animal or plant world. As we close the book we are filled with a feeling of admiration for the author's powers of observation for details which can so often be overlooked by most of us, but which, thanks to Mr. Bayne, are now brought to our notice in a delightful manner.

(3) *HOW TO LOOK AT OLD CHURCHES*, by H. S. Stowell, L.B.I.B.A., has now reached its second edition, thus proving its usefulness.

Mr. W. E. Glegg has contributed some valuable articles on the Birds of the Essex Rivers to the Essex Naturalist. H.J.B.

REPORTS FOR THE YEAR

THE COUNCIL

○ N the score of economy, the custom of previous years will be followed, and no balance sheet be printed. The General Secretary will, however, be happy to forward a copy of the sheet to any member on application. The income for general purposes amounted to £59 5s. 7d., an increase of £8 19s. 7d.; the expenditure to £50 9s. 2½d., an increase of £8 19s. 9½d.: the credit balance for the year was £8 16s. 4½d., which added to £25 19s. 5d., brought in from the previous year, leaves the general account with a credit balance of £34 15s. 9½d. The Life Composition Account has risen by £15, from £25 to £40. The debit balance on the "London Naturalist" account is £17 1s. 0½d. against £17 18s. 5½d., a reduction of 17s. 5d. The total credit balance has risen from £38s. 0s. 11½d. to £57 14s. 9d., an increase of £24 13s. 9½d.

The membership is rising; leaving out of account for the moment the erasure under Rule 31 of names of members long in arrears with their subscriptions (an operation which took place during the year after an interval of three years), the losses numbered five, whilst the number of new members was twenty-seven. The net increase of paying members was twenty-two, an encouraging figure; and this accounts for the bulk of the increase in general income stated above. Erasures under the rule quoted resulted in the striking off of ten names. The recension of the list will take place annually in future and there should then be a general correspondence in any year between the ebb or flow of membership and that of income. Five new Branch Associates were admitted, against three losses, whilst erasures numbered four. There was no new Country or School Associate, and under this head occurred one loss and two erasures.

The attendances at Winchester House expanded, the average rising from 38·8 to 44. The average attendance of members was 30·4, and of visitors 13·6. The programme of meetings was up to the high standard now fortunately usual. The Council were particularly glad to welcome as a lecturer on two occasions Mr. A. S. Le Souef, C.M.Z.S., R.A.O.U., of the Taronga Zoological Park, Sydney, Australia. A striking feature of many of the lectures was the artistic beauty of the slides with which they were illustrated.

The Sections carried out a full programme of field meetings, these numbering 39 against 40 in the previous year. The General Strike was responsible for the abandonment of several out-door meetings. Mrs. W. Boyd Watt again acted as delegate to the Annual Congress of the South-Eastern Union of Scientific Societies: whilst the President visited Bishops Stortford College to judge the exhibits at the annual

natural history competition. The Chingford Branch held a series of successful meetings under the guidance of its Chairman, the Rev. H. J. Gamble, and Secretary, Mr. E. Samuelson.

The thanks of the Council are due to the Librarians and Curators for their work in reorganising and popularizing the Society's library and collections. A notable addition to the latter was the gift by Mr. F. Cross of his collection of British lepidoptera.

The year was one of progress on well-tested lines, and the Council highly appreciate the enthusiasm shown by members. It was decided to make at the beginning of 1927 a special request to members to enlist new members. With the existing very low subscription, a large membership is essential, if the numerous activities of the Society are to be enlarged, the "London Naturalist" to grow to its proper size, and the Society to assume a fitting place among the field clubs of the country.

J. P. HARDIMAN,
General Secretary.

BOTANICAL SECTION

SEVEN expeditions were carried out during the year, the last being a fungus foray at Oxshott led by Mr. J. Ramsbottom, the distinguished mycologist from the Natural History Museum.

At the sectional meeting on November 16th, Mr. John Fraser, F.L.S., one of the first authorities in the country on the subject, read a most able and interesting paper on "British Willows."

A scheme has been inaugurated during the year for revising and bringing up to date De Crespigny's little book, "A New London Flora" which was published in 1877, and members have been assisting the Chairman in the work, but more helpers are wanted before the local lists are ready for publication. The area of the book covers a radius of about 30 miles round London, and embraces places as far distant as Godalming and Southend.

It is hoped to form a collection of plant photographs on the lines of the valuable collection of bird portraits formed by the Ornithological Section.

Additions to the botanical records for the Society's district are now, in the main, enlargements of the distribution of plants already known, for certain areas are still imperfectly examined. Of the 15 new species recorded several are aliens or casuals, but the following call for notice.

In the Northern Section:—*Rosa tomentosa*, Sm., var. *eglandulosa*, W.Dod., *Drosera longifolia*, L., both discovered in Epping Forest by B. T. Ward. The latter plant is apparently new to Essex.

In the Southern Section:—*Helleborus foetidus*, L., was added to our records, being found in some quantity in its old Surrey Station. *Lilium*

Martagon, L., was seen in bloom, but it is reduced considerably in quantity. Several stations for the local *Cynoglossum montanum* were discovered. The beautiful *Lathyrus tuberosus*, L., is well established in a locality in East Surrey, in bushy ground. The sweet pea scent of this flower is very noticeable when freshly gathered, but it is not retained for more than a day or so. The following species were also added to the record on the authority of the Botanical Exchange Club reports:—*Rubus pubescens*, Whe., var. *subinermis*, Rogers, *Myriophyllum spicatum*, L., *Centaurea Jacea*, L.

Outside our radius a record of special interest is the discovery by Messrs. E. M. and L. G. Payne of the ferns *Lastrea aemula*, Brackenridge, and *Hymenophyllum tunbridgense*, Sm., in a locality in Mid-Sussex. On the excursion to Fyfield in July *Lathyrus tuberosus*, L., and *Trifolium ochroleucum*, Huds., were found in quantity, and the visit to Chobham Common in September was equally successful, the special objective *Gentiana Pneumonanthe*, L., being seen over a wide area. *Spiranthes autumnalis*, Rich., also occurred freely in the neighbourhood.

Two of our members had the pleasure of seeing *Stachys alpina*, L., in its sole British station in the Western Cotswolds.

HERMAN SPOONER, *Chairman*.

LAWRENCE J. TREMAYNE, *Secretary*.

ENTOMOLOGICAL SECTION

SECTIONAL papers read dealt with "Sawflies" by Mr. J. C. Robbins on June 1st, and "The Genus *Tilia* and its Insects" by Messrs. J. C. Robbins and R. W. Robbins.

The weather was frequently unfavourable for outdoor work, and few captures of interest seem to have been made. Mention should, however, be made of a beautiful example of *Euchloe cardamines* tipped with pale lemon yellow instead of orange, which was taken by Mr. R. W. Robbins on June 13th, in Northamptonshire.

Gonepteryx rhami was a conspicuous insect in the spring and again during the latter part of the season. *Pyrameis cardui* was recorded in some numbers in various localities, and Mr. Tremayne reported one seen in St. James's Park. He also met with *Limenitis sibylla* near Puttenham, and *Satyrus semele* in Windsor Park. *Noctua glarea* was taken by Mr. R. W. Robbins near Sunningdale at the Botanical excursion on Sept. 4th. Mr. Aris recorded seeing all four species of *Vanessa* together in Cornwall, and a male *Amorpha populi* taken on Sept. 5th.

Mr. J. C. Robbins has continued his work on Sawflies. He has also been successful in breeding some interesting parasites, including a Chalcid, *Eurytoma curta*, Wlk., from *Urophora solstitialis*, L., and a Tachinid, *Diplostichus janitrix*, Htg., from the Sawfly, *Diprion pini*, L., from Esher (See "Proc. Ent. Soc. London," Vol. II., 1927). Adults of



SWARM OF MITES (*Tetranychus lintearius*, Duf.)
On a bush of Gorse (*Ulex europaeus*) near Fittleworth
Photograph by Mrs. Wilde

E. curta and its host, *Urophora solstitialis* emerged between July 12th and August 14th, from galled heads of *Centaurea nigra*, L., collected at Limpsfield, February 14th. ~~A single *D. janitrix* emerged, probably about August 10th, from the cocoons spun by a larva of *D. pini* collected on a garden rose at Limpsfield, August 31st, 1925. Imagines of *D. pini* from larvae collected at the same time, emerged from May 20th to June 10th.~~

The mite *Tetranychus lintearius*, Duf., was found swarming in enormous numbers on a bush of *Ulex europaeus* near Fittleworth. The bush measured 15 feet by 12 in diameter and was 6 feet high, the whole being densely covered by layers of white webbing enshrouding the clusters of mites.

H. J. BURKILL, *Secretary*.

PLANT-GALLS SECTION

THE Section visited Headley, June 26th; Epping Forest, July 4th; Effingham and Ockham Commons, September 25th; and Limpsfield, October 9th, when some interesting notes on various species were made. An unofficial visit was also made by some of the members to Fittleworth, Sussex, in September when attention was especially directed to the Roses, as *Rhodites* galls have been plentiful.

The following records of galls on their respective host-plants are selected from the mass of material collected during the year.

Cardamine pratensis, L.—*Centhorrhynchus pectoralis*, Schult. Headley, H. J. Burkill.

Lychnis diurna, Sibth.—*Contarinia steini*, Kursch. Sussex, H.J.B.

Geranium molle, L.—*Eriophyes* sp. Possibly *E. Schlectendali* Nal., as the plants were growing among the next species. Sussex, H.J.B.

Erodium cicutarium, L'Herit.—*E. Schlectendali*, Nal. Sussex, H.J.B.

Rhamnus catharticus, L.—(1) *Eriophyes annulatus*, Nal. New Forest, L. B. Hall.—(2) Margins of leaves rolled tightly upwards, apparently due to mites. New Forest, L.B.H.

Acer Pseudo-platanus, L.—(1) *Eriophyes* sp. (Houard, ? 3980.) This gall appeared again in Chiswick where it was observed in 1925. Another tree some three hundred yards away which was attacked in 1925 showed none of the galls this year, but several of its leaves were as usual attacked by *E. macrorrhynchus*, Nal. On Putney Heath the tree attacked last year has been severely pruned and no large galls were detected, only those of *E. macrorrhynchus*. Near Leatherhead it was not seen. H.J.B.—(2) *Eriophyes* sp. Leaves very much curled, and the under surface densely covered with short hairs. Fulmer, H.J.B.—(3) ? *Eriophyes* sp. The old flowers and young seeds densely covered with short hairs, which suggest the presence of mites but none were detected on microscopical examination.

Ulex Galii, Planch.—*Aption scutellare*, Kirby. Dorset, L.B.H.

Medicago lupulina, L.—*Perrisia trifolii*, F. Low. Sussex, H.J.B.
Trifolium pratense, L., var. *parviflorum*, Bab. Constriction of the calyx preventing the corolla from expanding. Due to Aphides. Fetcham, Surrey, H.J.B.

Amygdalus persica, L.—*Anuraphis persicae*, Buckt. Cobham, Surrey, H.J.B.

Rubus idaeus, L.—*Perrisia plicatrix*, H. Low. Sussex, H.J.B.
Rubus rusticanus, Merc.—*Diastrophus rubi*, Hartig. Leatherhead, H.J.B.

Rosa arvensis, Huds.—*Rhodites eglanteriae*, Hartig. Effingham, H.J.B. (2) *Perrisia rosarum*, Hardy. Sussex, E. B. Bishop. *R. stylosa*, Desv., var. *systyla*, Baker.—(1) *Rhodites rosarum*, Giraud. Sussex, E.B.B. (2) *Rh. eglanteriae*, Hartig. Sussex, E.B.B. (3) *P. rosarum*, Hardy. Sussex, E.B.B. *R. spinosissima*, L.—*Rh. spinosissimae*, Giraud. Very abundant in a London locality, H.J.B. Also on the South Downs near Chanctonbury, E.B.B. *R. spinosissima*, var. *pimpinellifolia*, L.—*Rh. spinosissimae*, Giraud. South Downs near Chanctonbury, E.B.B. *R. canina*, L.—(1) *Rh. rosae*, L. Sussex, H.J.B. and E.B.B. (2) *Rh. eglanteriae*, Hartig. Sussex, H.J.B. and E.B.B. Surrey, H.J.B. (3) *Rh. rosarum*, Giraud. Sussex, E.B.B. *R. dumetorum*, Thuill.—*Rh. rosae*, L. Sussex, E.B.B. *R. dumetorum*, Thuill., var. *jactata*, Desegl.—*Rh. rosarum*, Giraud. Sussex, E.B.B. *R. micrantha*, Sm.—(1) *Rh. rosae*, L. Sussex, E.B.B. (2) *Rh. eglanteriae*, Hartig. Sussex, E.B.B.

Viburnum Lantana, L.—(1) *Oligotrophus Solmsii*, Kieff. In various places along the North Downs, H.J.B. (2) *Contarinia lonicearum*, F. Low. Box Hill, and Polesden Lacy, H.J.B. (3) *C. viburni*, Kieff. With the last species, H.J.B. (4) *Eriophyes viburni*, Nal. Fetcham
Asperula cynanchica, L.—*Phyllocoptes minutus*, Nal. Fetcham Downs, H.J.B.

Gnaphalium uliginosum, L.—*Pemphigus filaginis*, Fonsc. Sussex, H.J.B.

Achillea Millefolium L.—*Oxyna flavipennis*, H. Low. Fetcham. H.J.B.

A. Ptarmica, L.—*Eriophyes* sp. This gall, first noted last year, was again plentiful in the same locality near Wimbledon, H.J.B.

Hieracium boreale Fr.—*Carpotricha pupillata*, Fallen. Sussex, E.B.B.

H. tridentatum, Fr.—*C. pupillata*, Fallen. Sussex, E.B.B.

Fraxinus excelsior, L.—*Eriophyes* sp. Patches of brown hairs on the under surface of the leaf. Sussex, H.J.B.

Solanum Dulcamara, L.—*Aphis* sp. Leaves crumpled and curled. L. J. Tremayne.

Ulmus montana, Stokes.—(1) *Eriophyes* sp. Patches of white hairs on the under surface of the leaf. Leatherhead, J. Ross and B. T. Ward. (2) *Eriophyes* sp. Veins of the leaves twisted and curved. Leatherhead, H.J.B. (Houard, 6551). (3) *Eriophyes ulmi*. Nal. Tufts of white hairs in the axils of the veins. Fetcham, H.J.B.

Betula alba, L.—*Eriophyes* sp. The "big bud" bluntly keeled,

recorded from Epping Forest last year was found in May on Wimbledon Common. Microscopic examination disclosed mites and eggs. These specimens were compared at the time with *Eriophyes rudis*, Can., and they are apparently not identical, H.J.B.

Carpinus betulus, L.—*Eriophyes tenellus*, Schl. Bucks, H.J.B.

Quercus intermedia, Don.—*Neuroterus laeviusculus*, Schenck. Fittleworth, E.B.B. *Q. ilex*, L.—*Eriophyes ilicis*, Can. Arundel, H.J.B. *Q. cerris*, L.—(1) *Andricus curvator*, Hartig. Claygate, H.J.B. (2) *A. circulans*, Mayr. Ham Common, H.J.B. (3) *A. testaceipes*, Hartig. Sussex. H.J.B. (4) *Callirhytis glandium*, Giraud. This gall was found in considerable quantity at Martyr's Green, and near Limpsfield, H.J.B.

Fagus sylvatica, L.—*Eriophyes nervisequus*, Can. var. *maculifer*, Trotter. Very fine specimens were found near Leatherhead, J. Ross.

Salix pentandra, L.—*Eriophyes triradiatus*, Nal. Seven trees in the clump on Wimbledon Common are now attacked by this mite, H.J.B. *S. alba*, L. \times *triandra*, L. (*undulata*, Ehrh.)—*E. triradiatus*, Nal. Kew, J. Fraser. *S. cinerea*, L.—*Agromyza Schineri*, Giraud. Several fine series of galls at Effingham, J. Ross, and at Limpsfield, J. C. Robbins.

Populus tremula, L.—*A. Schineri*, Giraud. Wimbledon Common, H.J.B. This gall was apparently recorded by Connold for Britain but without a name.

Phragmites communis, Trin.—*Lipara lucens*, Meigen. Very abundant at the Black Pond, Esher this year, H.J.B.

Sequoia sempervirens, Endl.—*Eriophyes* sp. (possibly *psilaspis*, Nal.) enlarging the buds. Dorset, L.B.H.

Taxus baccata, L.—*Eriophyes psilaspis*, Nal. Leaves and shoots distorted as well as the buds. Surrey, H.J.B.

H. J. BURKILL, *Secretary*.

ARCHAEOLOGICAL SECTION

A PLEASING feature of this year's activities was the marked increase of attendances, both at the sectional meetings and excursions; the former being largely due to the action of the committee in their attempt to make such meetings more attractive by the introduction of a "special item." These items: Mr. Chapman's paper on the Legend of St. Edmund, and Mr. Roberts, on St. Albans, were both very interesting; and the meetings were attended by 23 and 27 members and friends respectively. The excursions to Bow, Lingfield and Iver Churches were very successful and were attended by 20, 19 and 17 members and friends respectively.

The thanks of the Section are due to Mr. Stowell for kindly undertaking the duties of secretary for six months of this year, while the Secretary was away.

W. C. FORSTER, *Secretary*.

ORNITHOLOGICAL SECTION

MR. C. S. BAYNE was elected to represent the section on the Publicity Committee of the Royal Society for the Protection of Birds. The Section has to congratulate Mr. J. P. Hardiman, C.B.E., on his election to the Council and the Watchers' Committee of that Society.

SECTIONAL MEETINGS

Two Sectional meetings were held at which the following papers were read:—January 19th, "The Identification of Bird Remains," by Mr. P. W. Horn; November 16th, "Some Birds from Algeria," by Miss G. Lister, F.L.S.

On December 11th, members visited the Ornithological Department of the British Museum of Natural History when Mr. N. B. Kinnear, C.M.Z.S., M.B.O.U., kindly gave a demonstration on Extinct Birds.

The monthly field-meetings continue to be a success. Visits were made during the year to the following districts in the order named:—Tring, Thames Marshes, Ruislip, Essex Marshes, Chilterns, Broxbourne, Leatherhead, Chalfont Country, Tring, Kentish Marshes, Cheshunt Common, and Harefield.

The Committee are anxious to increase the success of the monthly field-meetings by discovering suitable new ground, frequented by ducks, waders and other water-birds, and will welcome suggestions.

Five Saturday afternoon walks were organized, the localities visited being Epping Forest (three visits), Barnes Reservoirs, and Richmond Park. A Sunday morning visit was also made to Wanstead Park.

RINGING AND COLLECTIONS

Schedules relating to 399 birds of 38 different species were sent in under the "British Birds" marking scheme, considerable assistance in this connection having been given by our correspondents, Miss F. Collins and Mr. R. W. Hale.

Two birds have been reported as recovered, both having been marked by Miss F. Collins, as follows:—(1) A starling ringed near Worthing, Sussex, as a nestling, on May 12th, 1924, was reported near where ringed on February 3rd, 1926; (2) A linnet ringed near Worthing, Sussex, as a nestling, on June 5th, 1925, was reported at Villeneuve de Marsan (Landes), France, in December, 1925.

The photographic collection now stands at 158 sheets.

The Section have to acknowledge the receipt of the skins of a Bittern and of a Kite, both with data, kindly presented by the Royal Society for the Protection of Birds.

The thanks of the Section are due to a number of correspondents who have kindly furnished notes and records.

JOHN E. S. DALLAS, *Chairman*.

SYDNEY G. POOCK, *Hon. Sec.*

NEW SPECIES

Three species new to the Society's district have been recorded, making the total number 182. These were:—*Phalacrocorax aristotelis* (Linnæus), SHAG, January 12th, seen sitting all day on the boom moored inside the lock gates of the Wapping basin, London Docks (T. M. Blagg, per S. Austin). *Sterna macrura*, Naumann, ARCTIC TERN, September 6th and 13th, two on Barnes Reservoir (L. Parmenter); September 14th, same place, one in summer plumage, (J. P. Hardiman). *Sterna s. sandvicensis*, Latham, SANDWICH TERN, August 28th, two on Barnes Reservoir (A. Holte-Macpherson).

The following record in "British Birds," Vol. XX. p. 226, has been accepted by the Editor of that journal as a "probable." It is mentioned here, but the species has not been added to the Society's list:—*Surnia ulula* (subsp.), HAWK OWL, December 27th, observed at West Molesey Reservoir by W. Kay Robinson and R. W. Heenan.

INTERESTING RECORDS

Other interesting records are as follows:—

MAGPIE, *Pica p. pica* (Linnæus), January 10th, three on Fetcham Downs (J. E. S. Dallas); April 29th, Edgwarebury (L.P.); and May 17th, St. James's Park (L. J. Tremayne).

BRAMBLING, *Fringilla montifringilla*, Linnæus, July 28th, 30th, and July 9th, Hampstead Heath (R. W. Petben), ("British Birds," Vol. XX., p. 149). YELLOWHAMMER, *Emberiza c. citrinella*, Linnæus, April 11th, Walthamstow Reservoirs (R.W.P.).

WOOD-LARK, *Lullula a. arborea* (Linnæus), April 17th, Box Hill (J.P.H.); April 18th, Box Hill, Headley, steady view on ground (J.P.H. and R. W. Robbins); June 20th, Headley Lane (pair), (J.E.S.D.); July 4th and 18th, Box Hill (new part) (J.E.S.D.).

YELLOW WAGTAIL, *Motacilla flava rayi* (Bonaparte), Barnes Reservoir, August 5th (A.H.M.); August 28th (J.P.H.); at least 100.

SEDGE-WARBLER, *Acrocephalus schœnobæus* (Linnæus), May 7th, heard singing in sanctuary by the Long Water, Kensington Gardens (C. Oldham). WOOD-WARBLER, *Phylloscopus s. sibilatrix* (Bechstein), May 5th, heard singing near Round Pond, Kensington Gardens (C.O.).

MARTIN, *Delichon u. urbica* (Linnæus), November 28th (late date), Staines town (A.H.M.).

SWIFT, *Micropus a. apus* (Linnæus), April 23rd (early date), Lonsdale Road Reservoir (A.H.M.).

BRITISH TAWNY OWL, *Strix aluco sylvatica*, Shaw, November 14th, Walthamstow Reservoirs (R.W.P.).

BUZZARD, *Buteo b. buteo* (Linnæus), June 20th, 1925, seen sailing over Hayes Common, going N.E. (C. W. Colthrup) ("British Birds," Vol. XX., p. 55); seen early in October flying at moderate height over Hyde Park in N.W. direction (Hon. G. Charteris) ("British Birds," Vol. XX., p. 228).

CORMORANT, *Phalacrocorax c. carbo* (Linnæus), December 27th, 1925, Highgate Ponds (Mrs. W. Boyd Watt); Barnes Reservoir, August 5th, 21st, 25th, and 29th (J.P.H., L.P., and A.H.M.)

COMMON SHELD-DUCK, *Tadorna tadorna* (Linnæus), September 18th, Barnes Reservoir (8) (L.P.). GADWALL, *Anas strepera*, Linnæus, March 21st and September 26th, Kensington Gardens, (L.P.). WIGEON, *Mareca penelope* (Linnæus), Molesey Reservoirs, February 7th and 20th, Barnes Reservoir, March 3rd (J.P.H.); Barnes Reservoir, October 3rd and December 11th, Staines Reservoir, October 31st and November 28th (A.H.M.). SHOVELER, *Spatula clypeata* (Linnæus), Staines Reservoir, February 28th, Barnes Reservoir, March 28th and October 17th (A.H.M.). PINTAIL, *Dafila a. acuta* (Linnæus), March 7th, Staines Reservoir (A.H.M.). POCHARD, *Nyroca f. ferina* (Linnæus), February 11th, Brent Reservoir, flock of 150 (J.P.H.); October 30th, Walthamstow Reservoir, flock of at least 168 (R.W.P.). SCAUP, *Nyroca m. marila* (Linnæus), February 21st and 25th, Molesey Reservoir, 7 (4 old males) (A.H.M., and J.P.H.). GOLDEN-EYE, *Glancionetta c. clangula* (Linnæus), Barnes Reservoir, January 4th, (J.P.H.), December 4th and 11th (A.H.M.); Molesey Reservoir, February 7th and 20th (J.P.H., and A.H.M.), November 10th (L.P.); Staines Reservoir, March 18th (J.P.H.), October 31st and November 28th (A.H.M.). COMMON SCOTER, *Melanitta n. nigra* (Linnæus), November 21st, Staines Reservoir (A.H.M.). GOOSANDER, *Mergus m. merganser*, Linnæus, Barnes Reservoir, January 4th, 10th, 19th, and December 4th (J.H.P. and A.H.M.); Molesey Reservoir, January 16th, February 7th, 15th, 20th, 21st, and 25th (greatest number 40) (J.P.H., A.H.M., and L.P.); Staines Reservoir, March 18th, 27th, and December 27th (J.P.H. and A.H.M.); Penn Ponds, Richmond Park, January 7th (Miss H. Watkins). SMEW, *Mergellus albellus* (Linnæus), Barnes Reservoir, January 4th, 10th, and 19th, February 4th, March 3rd and 28th (none left), November 14th (unusually early arrival), December 4th, 8th, 11th, and 26th (J.P.H., A.H.M., and L.P.); Molesey Reservoir, January 16th, February 7th, 15th, 20th, 21st, and 25th (J.P.H., A.H.M., and L.P.); Penn Ponds, January 11th and 12th (Miss H.W.); Walthamstow Reservoirs, January 3rd and 16th, February 18th (R.W.P.).

DUNLIN, *Erolia a. alpina* (Linnæus), Staines Reservoir, January 16th; Barnes Reservoir, August 3rd (A.H.M.) GREENSHANK, *Tringa nebularia* (Gunnerus), September 5th, Brent Reservoir (8) (L.P.) COMMON SANDPIPER, *Tringa hypoleucos*, Linnæus, seen from May 1st until October 2nd, at the Brent, Staines, Hampton and Barnes Reservoirs (L.P., J.P.H. and A.H.M.). One seen on Long Water, Kensington Gardens, August 20th (L.P.). Heard calling at dusk overhead at Clapton, September 8th (R.W.P.). GREEN SANDPIPER, *Tringa ochropus*, Linnæus, September 27th, Barnes Reservoir (L.P.). CURLEW, *Numenius a. arquata* (Linnæus), January 16th (1), August 28th (small party), Staines Reservoir (A.H.M.). RINGED PLOVER, *Charadrius h. hiaticula*, Linnæus, October 10th, Brent Reservoir (5) (L.P.).

GREATER BLACK-BACKED GULL, *Larus marinus*, Linnæus, September 16th, 17th, October 17th and November 9th, Barnes Reservoir (J.P.H., A.H.M. and L.P.). BRITISH LESSER BLACK-BACKED GULL, *Larus fuscus affinis*, Reinhardt, Barnes Reservoir, August 3rd-Novem-

ber 6th (greatest number 9) (J.P.H., A.H.M. and L.P.); Staines Reservoir, August 21st (J.P.H. and A.H.M.). BLACK-HEADED GULL, *Larus r. ridibundus*, Linnæus, July 3rd, Barnes Reservoir, 8 juveniles, only a few weeks old (A.H.M.). (Reported in "Field," November 28th). COMMON TERN, *Sterna h. hirundo*, Linnæus, December 16th, 1925, two on Tooting Bec Common, December 17th, 1925, twelve over West Norwood (E. C. Stuart-Baker) ("British Birds," Vol. XIX., p. 256); August 7th (1) and 29th (8), Barnes Reservoir (A.H.M.). LITTLE TERN, *Sterna a. albifrons*, Pallas, August 6th, Barnes Reservoir, 1 adult (J.P.H.). BLACK TERN, *Chlidonias n. niger* (Linnæus), August 21st, Staines Reservoir, 2 immature (J.P.H. and A.H.M.).

PUFFIN, *Fratercula arctica grabæ* (C.L.Brehm.). A storm-blown bird captured on the roof of a house on Rosslyn Hill, Hampstead, November 16th, and deposited in the Zoological Gardens (D. Seth-Smith, per H. and W. Boyd Watt).

RED-NECKED GREBE, *Podiceps g. greseigena* (Boddaert), January 24th, Staines Reservoir (A.H.M.). SLAVONIAN GREBE, *Podiceps auritus* (Linnæus), December 27th, Staines Reservoir (J.P.H. and A.H.M.). BLACK-NECKED GREBE, *Podiceps n. nigricollis*, C. L. Brehm., September 8th and 9th, Regent's Park (R. W. Hale per S. G. Poock); Barnes Reservoir, September 14th-27th (J.P.H.), September 27th (L.P.); Staines Reservoir, October 16th and November 7th, (A.H.M.).

EEPING FOREST

Some interesting records are as follows:—

BRAMBLING, *Fringilla montifringilla*, Linnæus, November 28th (several), December 26th (1), Hill Wood (S. Austin). SWALLOW, *Hirundo r. rustica*, Linnæus, June 26th, one nest at High Beech (J.E.S.D.). MARTIN, *Delichon n. urbica* (Linnæus), June 26th, ten nests at High Beech (J.E.S.D.). LITTLE OWL, *Carine noctua mira* (Witherby), June 11th, near Forest Hotel (H. Playne, per S.A.). BUZZARD, *Buteo b. buteo* (Linnæus), February 22nd and 24th, Gillwell Lane (Miss A. Hibbert-Ware); February 28th, same place (Miss A.H.-W. and Mr. and Mrs. Boyd Watt) ("British Birds," Vol. XIX., p. 287). SPARROW-HAWK, *Accipiter n. nisus* (Linnæus). The pair mentioned in last year's report by Mr. S. Boardman, again nested in the Forest. HERON, *Ardea c. cinerea*, Linnæus. The Forest Superintendent wrote on September 16th that the keeper reported in May 53 nests in the Wanstead Park Heronry, being 6 more than in March. (The average for the past 9 years is 60). CORN-CRAKE, *Crex crex* (Linnæus). Heard at Buckhurst Hill, at Whitsun (A. B. Hornblower).

A. BROWN, Recorder.

Sparrowhawk.—Since making my notes concerning season 1925, I have continued paying visits to the Sparrowhawks' haunt.

The nest in 1926 was a reconstruction of the 1924 nest in a silver birch. I saw two young, but there may have been more.

Of the 16 species of birds whose feathers were found in the haunt in 1925, 12 of these species have again been represented amongst the Sparrowhawk's victims for 1926, together with the addition of two further species, namely Blue Tit and Cuckoo.—STUART BOARDMAN.

RAMBLER'S SECTION.

TEN rambles have been carried out during the year, and all have been thoroughly enjoyed. The attendance has varied between six and sixteen, the average being a little over ten.

In addition the Section also provided a paper for the general meeting of the Society on October 19th, by Mr. A. L. Simpson, well known under the pseudonym of "Pathfinder" to readers of "Evening News" and other journals. This paper which was on "London Commons and Forests" was an extremely able one and attracted a large attendance.

The arrangements made for the Section are running smoothly and well, and few improvements have been necessary during the year. The powers of the leader on each ramble have been somewhat extended, and probably it will be necessary further to extend these, so as to allow each leader to fix his own date, but the peculiar principle upon which this Section was designed has so far thoroughly justified itself in every way, and it is believed that the Section is already firmly established as a permanent and useful addition to the Society's activities.

A. B. HORNBLOWER, *Chairman*.

LAURENCE TREMAYNE, *Secretary*.

CHINGFORD BRANCH

THE number of local associates has been well maintained and the attendances have been normal, the highest being 84 and the lowest 10. Unfortunately the weather on the greater number of our meetings was very unfavourable. The following lectures were delivered: "Luminosity in Nature," by R. W. Pethen; "In Unknown Switzerland," by J. E. S. Dallas; "Insectivorous Plants," by R. W. Robbins; "Mountains," by E. Samuelson; "Palms and Angels," by Miss G. Lister, F.L.S.; "The Lea Valley," by Mrs. A. R. Hatley, B.Sc., F.R.G.S. In addition to the above, two evenings were devoted to lantern lectureries, viz., "Norway," by Miss Hibbert Ware, F.L.S.; "Mosses and Liverworts," by J. Ross; "Egypt," by Rev. H. J. Gamble, M.A.; and "Sand Dunes," by Mrs. B. Kay, M.Sc. The May lecture on "Darwin," by Lawrence J. Tremayne, had to be abandoned owing to the strike. There was also an excursion to Kew Gardens.

E. SAMUELSON, *Hon. Secretary*.

PAPERS READ TO THE SOCIETY

January 5th.—"Palms and Angels," Miss G. Lister, F.L.S.

February 2nd.—Annual Exhibition.

"Birds," Miss M. G. S. Best, F.Z.S., M.B.O.U.

"Mosses," A. W. Dennis.

"Parenzo," W. C. Forster.

February 16th.—"Birds seen in the Camargue," W. E. Glegg, F.Z.S., M.B.O.U.

March 2nd.—"Some Notes on the St. George Expedition to the Pacific," C. L. Collenette, F.E.S.

March 16th.—"Old Buildings and the Country Side," A. R. Powys.

April 13th.—"Horns," A. Capleton.

April 20th.—Bacot Memorial Meeting. "Insect Vision in relation to Flower Fertilisation," I. H. Burkill, M.A., F.L.S.

June 15th.—"Some Wonders of Australian Natural History," A. S. LeSouef, C.M.Z.S., R.A.O.U.

September 7th.—"Recent Work on Insectivorous Plants," R. W. Robbins.

October 5th.—"The Wild Animals of Australia," A. S. LeSouef, C.M.Z.S., R.A.O.U.

October 19th.—"London Commons and Forests," "Pathfinder."

November 2nd.—"Butterfly Migration," C. Mellows, M.A., F.E.S.

December 7th.—Annual General Meeting.

December 21st.—"Evolution of the House," Edward Yates.

LIST OF MEMBERS

It is particularly requested that Members will inform the Secretary as soon as possible of any change of address

HONORARY MEMBERS

- 1901 Grant, G. F. H., 3, Westbourne Street, Hyde Park, W.2. • (Arch.)
 1899 Massey, Herbert, M.B.O.U., F.E.S., Ivy Lea, Burnage, Didsbury, Manchester.
 (Lep., Orn., Ool.)
 1894 Burrows, Rev. C. R. N., F.E.S., The Vicarage, Mucking, Stanford-le-Hope,
 Essex. (Lep.)
 1927 LeSouef, A. S., C.M.Z.S., R.A.O.U., Taronga Zoological Park Trust, Sydney,
 Australia.
 1927 Wolstenholme, H., B.A., M.B.O.U., R.A.O.U., Wahroonga, Sydney, Australia.

MEMBERS

- 1892 Adkin, R., F.E.S., "Hodeslea," Meads, Eastbourne. (Lep.)
 1925 Aldred, Miss B. A., 16, Boscastle Road, Dartmouth Park, N.W.5.
 1927 Aldred, Miss K. V., 5, Ladbroke Court, Ladbroke Gardens, W.11. (Arch.,
 Orn.)
 1922 Aldred, Miss M., Flat 5, 21, Ladbroke Gardens, Notting Hill, W.11. (Orn.)
 1925 Archbould, R. S., Forest Way, Loughton. (Orn.)
 1924 Aris, A., 1, Ivy Villas, Oldfield Road, Hampton.
 1915 Aris, E. A., F.Z.S., 9, Oak Avenue, Priory Road, Hornsey, N.8. (Lep.)
 1925 Ash, Edward C., M.R.A.C., F.R.M.S., c/o Midland Bank, Chelmsford, Essex.
 (Pond Life, Spiders).
 1892 Austin, S., 43, Darenth Road, Stamford Hill, N. 16. (Orn., Arch.)
 1927 Baily, Miss A. R., Cressex Lodge, Binfield, Berks. (Arch., Bot., Orn., Ent.,
 Plant Galls, R.)
 1924 *Baker, Edward C. S., J.P., O.B.E., F.Z.S., F.L.S., M.B.O.U., H.F.A.O.U., 6,
 Harold Road, Upper Norwood, S.E. 19. (Orn.)
 1927 Baldock, G. R., 467, Hertford Road, Enfield Highway. (Lep.)
 1927 Barclay-Smith, Miss P., Park Lodge, Hervey Road, Blackheath, S.E.3. (Orn.)
 1927 Barr, Mrs. Margaret, 16, Roland Gardens, S.W.7. (Orn.)
 1903 *Battley, Mrs., 6, Craven Avenue, West Ealing, W. 13.
 1915 Bayne, Charles S., 56, Prince of Wales Mansions, Battersea Park, S.W.11.
 (Orn.)
 1926 Benn, Miss A., 68, South Esk Road, Forest Gate, E.7. (Orn.)
 1927 Best, Miss M. G. L., F.Z.S., M.B.O.U., 123, Cheyne Walk, S.W.10. (Orn.)
 1920 Biddiscombe, W., "Whincroft," Ivy Lane, Woking. (Bot.)
 1925 Bidwell, Edward, 12, Woodberry Grove, Finsbury Park, N. 4. (Orn.)
 1896 Bishop, E. B., "Lindfield," Marshall Road, Godalming. (Bot., Arch., Plant
 Galls, Orn.)
 1926 Blackett, Miss F., 196, Cromwell Road, S.W.5.
 1926 Blezard, Miss R., F.Z.S., 89, Eaton Square, S.W.1. (Orn., Bot.)
 1921 Blount, S., 40, Woodhurst Road, Acton, W.3. (Arch.)
 1925 Boardman, Stuart, "Green Rigg," Friary Lane, Woodford Green, Essex. (Orn.)
 1902 Braithwaite, J. O., 18, Warren Road, Chingford, E. 4. (Micr., Bot., Ent.)
 1910 Braithwaite, Miss N. A., 18, Warren Road, Chingford, E. 4.

- 1916 Brown, A., 44, Ravensdale Road, Stamford Hill, N. 16. (Orn., Arch., Geol., R.)
 1926 Browne, Miss Constance H., 219, Harlesden Road, Willesden, N.W.10 (R., Arch.)
 1915 Burkill, H. J., M.A., F.R.G.S., 3, Newman's Court, Cornhill, E.C.3. (Plant Galls, Lep., Bot., Geol., Orn., R.)
 1926 Burnet, Ian G. W., 80, Blenheim Gardens, N.W.2. (Orn.)
 1912 Capleton, A., Beaufort House, 37, Lansdowne Road, South Woodford. (Mam., Orn., R.)
 1926 Carr, Miss A. N., 7, Cambridge Road, Watford. (Orn. R.)
 1911 Chapman, E., 219, Harlesden Road, N.W.10. (Arch., Geol., R.)
 1927 Child, Miss E., Ridley House, 113, Gower Street, W.C.1. (R.)
 1910 Clark, J. W., "Hazeldene," 10, The Ridgeway, Chingford, E. 4. (Bot.)
 1904 Cockayne, E. A., M.A., M.D., F.R.C.P., F.E.S., 116, Westbourne Terrace, W.2. (Lep., Biol.)
 1925 Cocksedge, W. C., 6, Aldersmead Road, Beckenham, Kent. (Orn., Arch.)
 1907 Collenette, C. L., F.E.S., Gothic Lodge, Woodford Green, Essex. (Ent. Orn.)
 1927 Cook, C. A., Whincroft, Ivy Lane, Woking. (Bot., Orn.)
 1900 Cooper, B., 103, Bethune Road, Stamford Hill, N. 16 (Lep., Bot.)
 1892 Cyriax, R. C., 23, Aberdare Gardens, West Hampstead, N.W. 6. (Arch., Aryan question, Indo-European languages.)
 1920 Dallas, J. E. S., 38, Richmond Road, Islington, N. 1. (Orn., Bot.)
 1925 Dallas, Mrs. Rosa F., 38, Richmond Road, Islington, N.1.
 1922 Davis, E. J., M.I.Mech E., Milestone, Church Hill, Loughton. (Orn.)
 1926 Deane, Miss M.B.H., 1, Cromwell Place, S.W.7. (Orn.)
 1910 Dell, F. G., "The Hut," 55, Russell Road, Buckhurst Hill, Essex. (Pond life, Micr., Orn.)
 1927 Dolman, L. H., Trinity School House, Blackheath Hill, S.E.10. (Arch.)
 1927 Druce, F., M.A., F.L.S., 7, Calford Gardens, S.W.3. (Bot.)
 1927 Dunkerley, Rev. C. L., Laleham Vicarage, Staines, Middlesex. (Arch., Orn.)
 1905 Edelsten, H. McD., F.E.S., "Hillside," Lindfield, Sussex. (Lep.)
 1927 Emery, J. W., Windsor Lodge, 450, Upper Richmond Rd., S.W.15. (Orn.)
 1927 English, Miss F., 8, Dorville Rd., Ravenscourt Park, W.6. (Orn., Bot., Arch., R.)
 1927 Evans, E. B., 86, Emmanuel Road, Streatham Hill, S.W.12. (Orn.)
 1907 Eynon, Lewis, B.Sc., F.I.C., "Fernleigh," Hall Lane, Upminster, Essex. (Chem.)
 1925 Farish, Mrs., "Stapleton," 46, Culverley Road, Catford, S.E. 6.
 1926 Farthing, Miss M., Bedford House, 108, Baker St., W.1. (R., Arch.)
 1922 Forster, W. C., 40, Nevern Square, S.W.5. (Arch., R.)
 1924 Foster, John B., "Aldwick," Holland Road, Sutton. (Orn.)
 1920 Gamble, Rev. H. J., M.A., 14, Frederica Road, Chingford, E.4. (Arch., Conch.)
 1927 Gardiner, Miss L., 14a, St. James Road, S.W.17. (Orn., Arch.)
 1910 Gaze, W. E., 10, The Avenue, Highams Park, Chingford, E. 4. (Lep., Bot., Chem.)
 1909 Gerrard, V., 59, Campden Hill Court, Campden Hill Road, Kensington, W.8. (Lep.)
 1927 Glauert, L., Killuspy, Chesham Bois, Bucks. (Orn.)
 1910 Glegg, W. E., F.Z.S., M.B.O.U., The House, Albion Brewery, Whitechapel Road, E.1. (Orn.)
 1921 Glegg, Mrs., The House, Albion Brewery, Whitechapel Road, E.1. (Orn.)
 1927 Green, Roland, F.Z.S., Ruskin Studio, 7, New Court, Lincoln's Inn, W.C. (Orn.)
 1899 *Greenwood, M., M.R.C.P., M.R.C.S., "Hillcrest," Church Hill, Loughton, Essex. (Arch., Biol.)
 1920 Grinling, C. H., B.A., 71, Rectory Place, Woolwich, S.E.18. (Bot.)
 1927 Hale, R. W., 27, Abercorn Place, N.W.8. (Orn.)
 1898 Hall, L. B., F.L.S., "Lingdene," King's Avenue, Parkstone, Dorset. (Bot., Galls., Biol., Geol., Micr.)

- 1927 Halton, K. E., Ezbah, Chesham Bois, Bucks. (Orn.)
 1903 Hanbury, F. Capel, Westfield, Hoddesdon, Herts. (Lep.)
 1906 Hanbury, Frederick J., F.L.S., F.E.S., Brockhurst, East Grinstead. (Bot., Lep.)
 1897 *Hanson, P. J., "Burcroft," Village Road, Bush Hill Park, Enfield. (Orn. Arch.)
 1927 Hardiman, Miss A., 1, Chatsworth Road, N.W.2. (Orn.)
 1921 Hardiman, J. P., C.B.E., B.A., 1, Chatsworth Road, Brondesbury, N.W.2. (Orn., R.)
 1923 Harding, J. Rudge, O.B.E., Star and Garter Home, Richmond, Surrey. (Orn.)
 1925 Hart, C., 73, Windsor Road, Forest Gate, E.7. (Orn., Bot.)
 1910 Heath, G. H., M.A., 7, St. Philip's Road, Surbiton, Surrey. (Lep.)
 1926 Hibbert-Ware, Miss A., F.L.S., The White Cottage, Gillwell Lane, near Chingford. (Orn.)
 1926 Hillier, Mrs. B., Aberlyn, Crescent Rd., Bishop's Stortford, Herts. (Conch., Arch.)
 1921 Hobson, G. D., Christ's College, Cambridge. (Lep.)
 1919 Horn, P. W., 10, Sheringham Gardens, Romford, Essex. (Orn., Aquaria.)
 1905 Hornblower, A. B., 91, Queen's Road, Buckhurst Hill, Essex. (R., Arch., Orn.)
 1910 Howard, D. Lloyd, J.P., F.I.C., F.C.S., Pettits Hall, Chigwell. (Chem.)
 1927 Hussey, H. T., 416, High Road, Leyton, E.10. (Arch., Orn., R.)
 1927 Jago, R. P., F.Z.S., Rookwood, Bridle Road, Eastcote. (Orn.)
 1927 Jeffery, H. J., A.R.C.Sc., F.L.S., 45, Wilton Rd., Muswell Hill, N.10. (Bot.)
 1926 Jehan, Kenneth C., 49, Bruce Grove, Tottenham, N.17. (Bot.)
 1925 Jones, Mrs. D. Llewellyn, 5, Russell Gardens, Golders Green, N.W.11. (It.)
 1926 Jones, Jock Ll., 5, Russell Gardens, Golders Green, N.W.11. (R.)
 *Kaye, W. J., F.E.S., "Caracas," Ditton Hill, Surbiton, Surrey. (Lep.)
 1925 Korner, Miss Theodora, 4, Gunterstone Road, West Kensington, W.14. (R.)
 1927 Lane, J. H., 571/3, Commercial Road, E.1. (Chem.)
 1922 Lemon, F. E., M.A., I.L.B. (Cantab.), J.P., C.A., "Hillcrest," Redhill, Surrey. (Orn.)
 1922 Lemon, Mrs. M. L., M.B.E., J.P., M.B.O.U., F.Z.S., "Hillcrest," Redhill, Surrey. (Orn.)
 1919 Leyton Public Libraries, per the Librarian (Z. Moon, F.R.Hist.S.), Central Library, Leyton, E. 10.
 1927 Lister, Miss G., 871, High Road, Leytonstone, E.11. (Orn.)
 1926 Littlejohn, H.A., 27, Ethelbert Gardens, Cranbrook Park, Essex. (Orn.)
 1915 Loney, Herbert, 354, Goswell Road, E.C.1. (Lep., Bot., Geol., Orn., Plant Galls, Arch.)
 1926 Longfield, Miss C.E., F.R.G.S., F.E.S., F.Z.S., 20, Pont Street, S.W.1. (Orn., Ent.)
 1919 Lowne, B. T., "Ravenscroft," 129, Bromley Road, Catford, S.E. 6. (Bot.)
 1911 MacIntosh, Miss I. S., 69, Windmill Hill, Enfield. (Bot.)
 1911 MacIntosh, Miss J. D., 69, Windmill Hill, Enfield.
 1923 *Macpherson, A. Holte, F.Z.S., 21, Campden Hill Square, Kensington, W.8. (Orn.)
 1927 Main, Miss M., 55, Buckingham Rd., E.18. (Ent., Orn.)
 1923 Mann, Edward, 10, Frankland Road, South Chingford, E.4. (Pond Life).
 1916 Mann, F. G., Ph.D., B.Sc., A.I.C., The University Chemical Laboratory, Pembroke Street, Cambridge. (Lep. Orn.)
 1922 Martin, Alan R., 18, Kidbrooke Park Road, Blackheath, S.E.3. (Arch.)
 1926 Martin, Miss L., 21, Station Grove, Wembley, Middlesex. (Arch., Lep.)
 1927 McCullen, Miss A., 15, Cressex Lodge, Binfield, Berks. (Arch.)
 1887 Mera, A. W., 5, Park Villas, High Road, Loughton, Essex. (Lep.)
 1926 Mitchell, Miss E., 29, Aberdeen Road, Wealdstone, Middlesex. (Bot.)
 1924 Moore, Miss A. E., 44, Carlton Avenue, Kenton, Middlesex. (Orn.)
 1905 Moore, J. E., 6, Alwyne Villas, Canonbury, N. 1.
 1927 Mounsey, D. J., 5, Harewood Road, South Croydon. (Orn., Ent.)

- 1926 Niblett, Montague, 10, Greenway, Wallington, Surrey. (Plant Galls.)
 1893 *Nicholson, Miss B., "Rothbury," Langdon Road, Upper Parkstone, Dorset. (Bot.)
 1925 Norman, Cecil, F.L.S., 55, Eccleston Square, S.W. 1. (Bot. Orn.)
 1926 *Oldham, Charles, F.L.S., F.Z.S., M.B.O.U., The Bollin, Shrublands Road, Berkhamsted. (Bot., Orn., Conch.)
 1924 Palmer, Miss Fanny, 8, Ulundi Road, Blackheath, S.E.3. (Arch.)
 1925 *Parmenter, L., 8, Fitchborne Street, W.2. (Orn.)
 1921 Parsons, S. T. T., 129, Gloucester Terrace, W. 2. (Orn.)
 1922 Payne, C. H., 13, Kidderpore Gardens, Hampstead, N.W.3. (Orn. Arch.)
 1923 Payne, E. M., 23, St. George's Avenue, Southall, Middlesex. (Bot.)
 1901 Payne, H. T., 70, Castlewood Road, Stamford Hill, N. 16. (Lep.)
 1923 Payne, L. G., "Rosebay," The Tilt, Cobham, Surrey. (Bot.)
 1922 Pethen, R. W., 108, Northwold Road, Upper Clapton, E.5. (Orn. Ent.)
 1925 Pike, L. Elgar, 19, Caversham Avenue, Palmers Green, N. 13. (Rep. Ichth.)
 1927 Piper, Miss G. E. M., 12, Elms Road, Clapham, S.W.4. (Orn.)
 1925 Pock, Sydney G. 10, Fairfield Road, Crouch End, N.8. (Orn.)
 1910 Pratt, W. B., 10, Lion Gate Gardens, Richmond, Surrey. (Lep.)
 1926 Prout, L. B., F.E.S., 84, Albert Road, Dalston, E. 8. (Lep., Biol.)
 1892 Rankin, The Hon. Lady, 48, Eaton Terrace, S.W.1. (Orn.)
 1925 Richardson, Arthur, Barrowell Green, Winchmore Hill, N. 21.
 1891 Riches, J., 52, Calverley Grove, Hornsey Rise, N. 19. (Lep., Bot.)
 1922 Robbins, J. C., F.E.S., "The Rosery," Limpsfield, Surrey. (Bot., Arch., Ent.)
 1892 Robbins, R. W., "The Rosery," Limpsfield, Surrey. (Bot., Lep., Orn., Arch.)
 1893 Robbins, Mrs., "The Rosery," Limpsfield, Surrey. (Bot., Arch., Orn.)
 1925 Roberts, H. V. Molesworth, 7, Mallows Road, Wallington. (Arch.)
 1924 Robertson, Lady Dorothy, 66, Park Street, W. (Orn.)
 1910 *Ross, J., 18, Queens Grove Road, Chingford, E. 4. (Bot., Plant Galls, Orn.)
 1890 Routledge, G. B., F.E.S., Tarn Lodge, Headsnook, Carlisle. (Lep. Col. Hem.)
 1923 Sagar, H., Holly Hill Farm, Botany Bay, Enfield. (Orn., R.)
 1910 Samuelson, Edward, 2, Crown Buildings, The Green, Chingford, E.4. (Mam., Rep., R.)
 1901 Shaw, V. Eric, "Betula," Park View Road, New Eltham. (Hym. Lep. Mier., Api.)
 1927 Shoosmith, F. H., B.Sc., Ph.D., "Whitgift," Grange Road, Sutton, Surrey.
 1927 Simes, J. A., O.B.E., F.E.S., Kingsley Cottage, Queen's Road, Loughton. (Ent.)
 1911 Simpson, W., M.B., B.S., D.P.H., "The Ivies," 3, Adelaide Road, Andover, Hants. (Arch., Bot., Lep., Plant Galls.)
 1892 Smith, C. B., 61, Onslow Gardens, Muswell Hill, N. 10. (Lep.)
 1927 Smith, Miss G. L., 35, Maidenstone Hill, Greenwich, S.E.10. (Arch.)
 1926 Smith, Miss M. H., 23a, Glenfield Rd., Balham, S.W.12. (Orn., Bot.)
 1922 Spooner, Herman, 21, Musgrave Crescent, Walham Green, S.W.6. (Orn., Bot., Arch., R.)
 1927 Stanley, S. F., Eversley, The Crossways, Gidea Park, Essex. (Arch., Orn.)
 1927 Steinmann, E., 152, Lordship Road, Stoke Newington, N.16. (R., Orn., Bot.)
 1920 *Stowell, H. S., L.R.I.B.A., 26, Queen's Gardens, Faling, W.5. (Arch.)
 1927 Tarver, A., 7, Stuart Rd., Thornton Heath, Surrey. (Arch. Conch.)
 1926 Taylor, Mrs. K., 169, High Street, Homerton, E.9. (Orn.)
 1920 Thomas, Mrs. G. E., 9, Talbot Road, Isleworth, Middlesex. (Orn., R.)
 1927 Thresher, Miss G. A., 34, Henrietta Street, W.C.2. (Arch.)
 1892 Tremayne, L. J., Avenue House, Northumberland Avenue, W.C.2. (Bot., Lep., Arch., Plant Galls, Orn., R.)
 1908 Tremayne, Mrs., Avenue House, Northumberland Avenue, W.C.2. Orn., Arch., Bot. R.)
 1923 Trench, R. H., Hall Barn Cottage, Beaconsfield, Bucks. (Orn., R.)
 1925 Tucker, Leslie, F., "Danebury," The Chine, Grange Park, N. 21. (Lep.)
 1911 Van Lessen, R., B.Sc., 78, Wellington Road, Bush Hill Park, Middlesex. (Chem.)

- 1927 Veitch, Miss A., 3, Sherrard Road, Forest Gate, E.7. (Arch.)
 1927 Waller, G., 88, Beckenham Road, Beckenham, Kent. (Orn.)
 1925 Ward, Bernard T., 24, Long Deacon Road, Chingford, E.4. (Bot., R.)
 1911 Warren, S. Hazzledine, F.G.S., F.Z.S., "Sherwood," Loughton. (Prehistoric Anthropology, Geol.)
 1920 Watkins, Miss H., 12, Connaught Avenue, East Sheen, Mortlake, S.W. 14. (Orn., R.)
 1927 Watkins, Miss M. A., 12, Connaught Avenue, East Sheen, S.W. 14. (Arch.)
 1926 Watt, Hugh Boyd, 90, Parliament Hill Mansions, N.W. 5. (Orn. Ecology, Zoo., Bot.)
 1925 *Watt, Mrs. Winifred Boyd, 90, Parliament Hill Mansions, Lissenden Gardens, N.W. 5. (Orn.)
 1911 Wattson, R. Marshman, 32, St. Andrew's Road, Stoke Newington, N. 16. (Arch. Ent.)
 1927 Wharton, Miss D. C., xxth Century Club, 29, Stanley Gardens, W. 11. (Bot. Ent. R.)
 1913 Wilde, Mrs. C. L., "Lindfield," Marshall Road, Godalming. (Arch., Bot., Galls)
 1922 Wilkinson, E. B., F.L.S., 7, Colville Square, W. 11.
 1925 Wilks, M., 46, The Mall, Southgate, N. 14. (Bot.)
 1880 Williams, C. H., 5, Lower Belgrave Street, Eaton Square, S.W. 1. (Lep.)
 1902 Willson, A. J., 46, Dover Road, South Wanstead, Essex. (Lep.)
 1927 Wooltorton, F.L.D., B.Sc., 9, Southbury Road, Enfield, Middlesex. (Arch.)
 1926 Wright, Max A., The Press Club, St. Brides House, Salisbury Square, E.C. 4. (Orn., Bot.)

BRANCH ASSOCIATES

- 1927 Blake, Trevor, J. S., 91, Station Road, Chingford, E. 4. (Arch. Micr.)
 1927 Boothroyd, J. W., 27, Buxton Road, Chingford, E. 4.
 1920 Chandler, J. H., J.P., 22, Scholars Road, Chingford, E. 4.
 1923 Clark, Harold, "Hazeldene," The Ridgeway, Chingford, E. 4.
 1921 Collard, Miss Alice M., 19, Mount View Road, Chingford, E. 4.
 1925 Connoll, A., "Windyridge," Connaught Avenue, Chingford, E. 4.
 1914 Connoll, Miss E., 47, Buxton Road, Chingford, E. 4.
 1910 Cox, Oswald F., "Croftdown," Shepherd's Hill, Highgate, N. 6. (Bot.)
 1921 Davis, Mrs. F. H., 41, Mornington Road, Chingford, E. 4.
 1923 Dunn, Mrs. Edith M., 10, The Drive, Chingford, E. 4.
 1922 Dupère, Miss Frances, 87, Station Road, Chingford, E. 4.
 1920 Gain, Mrs. E. R., 49, Buxton Road, Chingford, E. 4.
 1926 Gamble, Mrs. H.M.A., 9, Park Hill Road, Chingford, E. 4.
 1926 Gamble, Miss Winifred, 9, Park Hill Road, Chingford, E. 4.
 1910 Greengrass, Miss Madeleine, The Croft, Chingford Green, E. 4. (Lep.)
 1920 Hart, Miss H., The Green Farm, Chingford, E. 4.
 1923 Harvey, Cecil O., B.Sc., 4, Park Hill Road, Chingford, E. 4. (Geol.)
 1922 Harvey, T. F., F.I.C., 4, Park Hill Road, Chingford, E. 4.
 1920 Huck, H., M.P.S., 35, Warren Road, Chingford, E. 4.
 1922 Hunt, S. L., 153, Romford Road, Stratford, E. 15. (Bot., Ent.)
 1926 Kay, Mrs. Beatrice, M.Sc., 7, Victoria Road, Chingford, E. 4. (Bot.)
 1924 Lambert, G., 37, The Ridgeway, Chingford, E. 4.
 1921 Lloyd, Miss F. M., 41, Mornington Road, Chingford, E. 4.
 1925 Mancell, W. A., 4, Connaught Avenue, Chingford, E. 4. (Orn.)
 1911 Mathieson, Miss M. L., 7, Crescent Road, Chingford, E. 4. (Meteorology.)
 1924 Nix, Miss, Mornington School, Chingford, E. 4.
 1922 Patterson, Dr. R., F.L.S., M.R.I.A., 16, Philbeach Gardens, Earl's Court, S.W. 5.
 1927 Pettit, Mrs. S., "Colham," 2, Victoria Road, Chingford, E. 4.

- 1927 Pettit, S., "Colham," 2, Victoria Road, Chingford, E.4.
 1920 Proctor, Mrs. E. M., 2, Woodland Road, Chingford, E. 4.
 1919 Puck, Alec, 12, The Ridgeway, Chingford, E. 4.
 1925 Radmall, Leslie, 48, Douglas Road, Chingford, E. 4.
 1923 Restall, W. L., J.P., "Chingwood," Woodland Road, Chingford, E.4.
 1925 Saul, H., Barclay's Bank, Chingford, E. 4.
 1903 Stevenson, H. E., F.C.S., 22, Wilton Grove, Wimbledon, S.W. 19. (Chem.)
 1927 Stopps, W. E., 6, Gordon Road, Chingford, E.4.
 1923 Trounce, J. P., J.P., "Woodside," Sewardstone Bury, Chingford, E.4.
 1923 Trounce, Mrs., "Woodside," Sewardstone Bury, Chingford, E.4.
 1922 Ward, Arthur H., "Mayfield," Kimberley Road, Chingford, E.4.
 1927 Wilkes, Miss L., 24, Woodland Road, Chingford, E.4.
 1922 Wright, W. A., "Ringstead," Old Church Road, Chingford, E.4. (Orn.)
 1920 Young, J., 87, Station Road, Chingford, E. 4.

COUNTRY AND SCHOOL ASSOCIATES

- 1924 Bailey, Mrs. Stephen, 45, Bridge Street, Godalming.
 1907 Bickham, Spencer H., Underdown, Ledbury. (Bot.)
 1908 Blake, W., Acacia Villa, Ross, Herefordshire. (Orn., Conch.)
 1908 Bostock, E. D., Oulton Cross, Stone, Staffordshire. (Lep.)
 1904 Cassall, Dr. R. T., F.E.S., Colwill House, Abertillery, Mon. (Lep.)
 1924 Collins, Miss Florence, School of Gardening, Clapham, near Worthing, Sussex. (Orn.)
 1904 Cooke, Rev. P. H., M.A., Ickleton Vicarage, Great Chesterford, Essex. (Bot.)
 1892 Culpin, Millais, M.D., F.R.C.S., "Meads," Loughton, Essex. (Biol.)
 1926 Farthing, Miss E., Jesmond House, Bradford Road, Batley, Yorks. (Arch.)
 1904 Grubb, W. C., Belgravia, Barberton, Transvaal. (Geol.)
 1923 Hardiman-Nash, K. O., Nightsgift, Highwood, Ringwood, Hants. (Orn.)
 1923 Hardiman-Nash, Mrs. E. G., Nightsgift, Highwood, Ringwood, Hants. (Orn.)
 1915 Hopkins, Prof. F. G., M.A., M.D., F.R.C.P., F.R.S., 71, Grange Road, Cambridge. (Biochemistry.)
 1902 Miller, Miss E., "The Croft," Rainsford Lane, Chelmsford. (Lep.)
 1905 Moore, J. W., Middleton Dene, Middleton Hall Road, King's Norton, Birmingham. (Lep.)
 1918 Pike, Oliver G., F.Z.S., M.B.O.U., The Bungalow, Leighton Buzzard.
 1914 Studd, E. F., M.A., B.C.L., F.E.S., Exeleigh, Starcross, Devon. (Lep.)
 1904 Ward, J. Davis, "Limehurst," Grange-over-Sands, Lancs. (Lep.)

NOTE.—The following abbreviations are used in the above lists:—Api., Apiculture; Arch., Archaeology; Ast., Astronomy; Biol., Biology; Bot., Botany; Chem., Chemistry; Col., Coleoptera; Conch., Conchology; Dipt., Diptera; Ent., Entomology; Ethn., Ethnology; Geol., Geology; Hem., Hemiptera; Hym., Hymenoptera; Ichth., Ichthyology; Lep., Lepidoptera; Mam., Mammalogy; Micr., Microscopy; Neur., Neuroptera; Orn., Ornithology; Orth., Orthoptera; Ool., Oology; R., Ramblers Section; Rep., Reptilia; Zoo., Zoology. * Signifies a Life Member.

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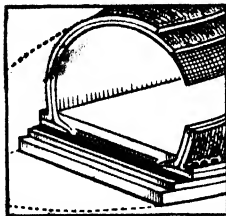
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